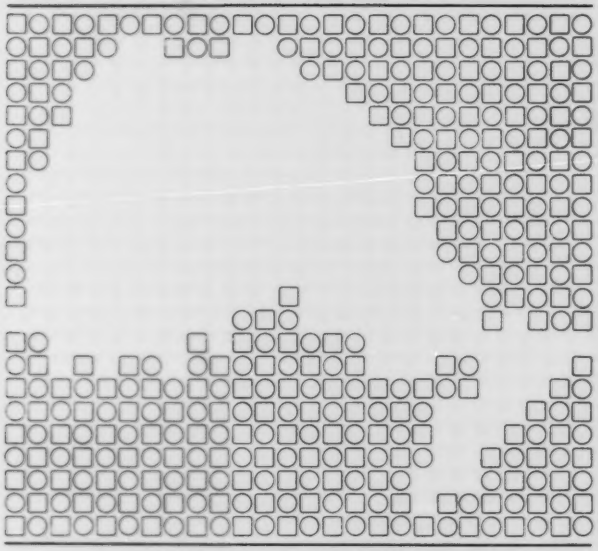
Ontario
Ministry of
Labour

Occupational
Health and Safety
Division

Designated Substances in the Workplace: A Guide to the Asbestos Regulation for Construction Projects, Buildings and Repair Operations



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Designated Substances in the Workplace: A Guide to the Asbestos Regulation for Construction Projects, Buildings and Repair Operations

April 1987

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Introduction

Long recognized as a serious occupational health hazard, asbestos was one of the first designated substances to be regulated under the Occupational Health and Safety Act (the Act). The Regulation respecting Asbestos, Ontario Regulation 570/82, was filed with the Registrar of Regulations on August 20, 1982. Construction projects were specifically excluded from the application of this regulation. It was the ministry's intention at the time to cover the construction industry in a second regulation that would prescribe procedures for controlling asbestos exposure.

Before development of the asbestos regulation for the construction industry could be completed, the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario tabled its report in the legislature. The commission recommended that the control by procedure approach planned for the construction industry be extended to activities that involve building maintenance and custodial work. The commission also considered regulation 570/82 inappropriate for certain repair operations. The commission's recommendations were accepted, and on December 16, 1985 the Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations, Ontario Regulation 654/85, was filed. This regulation came into effect on March 16, 1986.

This guide has been prepared to help employers, constructors, owners, workers, health and safety representatives, members of joint health and safety committees, supervisors and occupational health personnel meet the requirements of the designated substance regulation respecting asbestos on construction projects and in buildings and repair operations and to increase the awareness of all

participants in the workplace health and safety system of their responsibilities under this regulation.

The advice in this guide is the interpretation, by officials of the Occupational Health and Safety Division, of the Occupational Health and Safety Act (the Act) and regulations. The Occupational Health and Safety Division of the ministry is responsible for administering the Act.

The advice does not have binding effect but is intended to provide general answers to questions that may be asked in the context of a specific situation. It is being used by staff of the ministry to assist in the administration of the asbestos regulation.

Questions of construction and application will find their ultimate answer given by the courts where a contest ensues as to construction or application of a legislative provision.

This guide consists of a brief description of the hazards of asbestos (Chapter 1), an overview of the regulation (Chapter 2), and a detailed discussion of the provisions of the regulation (Chapters 3 through 12). Supplementary information is provided in 10 appendices.

For further information on any aspect of this asbestos regulation, you should contact the Inspectorate of the Ministry of Labour at the nearest district office. Addresses and telephone numbers of the ministry's district offices are listed in Appendix 9. Appendix 10 provides a list of reading materials that may be helpful in understanding the requirements of the regulation.

1. The Hazards of Asbestos

What Is Asbestos?

The term "asbestos" refers to a family of naturally occurring fibrous (asbestiform) hydrated silicates divided on the basis of mineralogical features into two groups: serpentines and amphiboles. The important and distinguishing property of asbestos, compared with non-asbestiform minerals, is the presence of long, thin fibres that can be easily separated. Although, according to some definitions, there are as many as 30 varieties of asbestos, only six are of commercial importance. These six are listed in the asbestos definition in section 1 of the regulation: actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite.

Chrysotile is the only asbestiform member of the serpentine group of minerals. Although commonly termed "white asbestos", chrysotile fibres may also be green, grey, amber or pink in colour. Chrysotile fibres have high tensile strength, high resistance to alkalies, high flexibility and good spinnability. About 90 per cent of world asbestos production is chrysotile.

Amphibole asbestos fibres differ from the flexible, curly chrysotile fibres in that they are straight and needle-like. These fibre characteristics appear to give amphibole asbestos a greater tendency to become airborne, which is important to the control of exposure. Two types of amphibole asbestos have been widely used: crocidolite or "blue asbestos" and amosite or "brown asbestos". Anthophyllite, tremolite and actinolite asbestos have been rarely used commercially.

How Has Asbestos Been Used?

The ability of asbestos to withstand high temperatures, its strength, its resistance to many corrosive chemicals and its other properties have resulted in hundreds of applications for asbestos. As many as 3,000 separate uses have been identified. The construction industry has been, and continues to be, the biggest user of asbestos. Although the use of asbestos has dropped dramatically in recent years, its past widespread use, particularly as an insulating material in buildings, means that it will continue to pose a potential hazard to the renovation and demolition sectors of the construction industry.

The largest single use of asbestos is as a reinforcing agent in cement products. Asbestos-cement products include flat and corrugated sheets, pipes and shingles. Another major use is friction materials, including linings for drum and disc brakes and clutch facings. Other asbestos-containing products are vinyl asbestos flooring, gaskets and packings, textile products such as welding blankets and theatre curtains, roofing felts, coatings and mastics, and asbestos paper products. The uses of asbestos are discussed more fully in Appendix 2.

One use of asbestos deserves special mention, and that is its use as an insulating material. Asbestos is an effective insulator against heat, cold, electricity and noise. In the late 1960s and early 1970s insulation was the largest use of asbestos. Amosite and chrysotile in combination and, to a lesser extent, crocidolite were widely used in sprayed insulation and as fireproofing for steel structures. In some cases the insulation was exposed to provide a decorative architectural finish. Elsewhere, it doubled as acoustical insulation. Asbestos pipe and boiler insulation was used on heating systems in buildings, including homes, and in industrial processes. In 1973 the spray application of asbestos insulation ceased when new regulations were introduced under the Ontario Construction Safety Act. Also in 1973 the major Ontario suppliers of pipe and boiler insulation stopped using asbestos in their products. Both these asbestos applications are prohibited by the new asbestos regulation (O. Reg. 654/85).

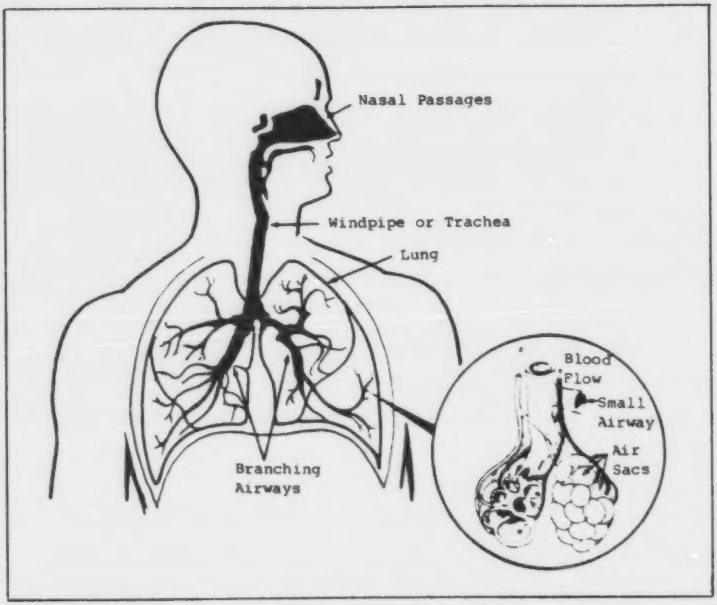

FIGURE 1 THE RESPIRATORY SYSTEM

Why Is Asbestos a Health Hazard?

Several diseases are associated with exposure to asbestos. They are asbestosis, mesothelioma, cancer of the lung and other asbestos-related cancers. These are serious, debilitating diseases that often end in death.

To cause disease, asbestos fibres must be inhaled into the lungs (Fig. 1). The lung is a system of branching airways that end in tiny air sacs, called alveoli. There are about 300 million of these in the lungs. It is from these air sacs that oxygen from inhaled air enters the bloodstream. This is also where inhaled asbestos fibres do their damage. However, only those fibres within a certain size range can gain access to the lung alveoli. Fibres with a diameter greater than three microns (one ten-thousandth of an inch) are too large and

impact with the upper branches of the respiratory system and are then eliminated. Fibres that can enter the lung and cause disease are too small to be visible to the naked eye.

It is not clear how asbestos fibres cause disease after they enter the lung. For each disease there is a period of latency, usually more than ten years, between first exposure to asbestos and the appearance of the disease. It is this characteristic that makes asbestos disease so insidious; exposure can continue for many years without any outward evidence of harm while disease develops silently within.

Asbestosis: Asbestosis is characterized by a fibrosis (scarring) of the lung tissue, which makes breathing difficult. The most prominent symptom is breathlessness. Early detection of asbestosis is possible by X-ray examination and lung function testing. However, the disease is irreversible and will continue to progress even after exposure is stopped. Rarely a cause of death itself, asbestosis results in an appreciable reduction in life expectancy due to deaths from related illnesses.

Mesothelioma: This is a rare cancer arising from the cells of the pleura (lining of the chest cavity and lungs) and the peritoneum (lining of the abdominal cavity). The development of mesothelioma is characterized by a long latency period, usually at least 15 years and sometimes more than 40. There is no effective treatment for mesothelioma. A large proportion of mesothelioma patients die within a year of diagnosis; few survive longer than five years. Although asbestos was once thought to be responsible for all mesothelioma, other causes have now been identified. Still, the chance of getting mesothelioma in the absence of asbestos exposure is considered to be extremely remote.

Lung Cancer: Unlike asbestosis and mesothelioma, lung cancer is not associated only with asbestos exposure. Furthermore, there is no basic difference between lung cancer caused by asbestos and that

due to other causes. In general, the risk of getting lung cancer increases with the extent of asbestos exposure, in terms of both intensity and duration. This risk is also greatly enhanced by smoking; most asbestos workers who develop lung cancer are smokers. The prognosis for persons diagnosed with lung cancer is poor. Only about one in twenty survives longer than five years after it is diagnosed.

Other Asbestos-Related Cancers: The relationship between asbestos exposure and asbestosis, mesothelioma and lung cancer has been clearly established and is beyond argument. Several other cancers have also been associated with the inhalation of asbestos. Although the evidence is not as good as for the diseases discussed above, these cancers should be noted. They are: gastrointestinal cancer affecting all sites in the gastrointestinal tract (oesophagus, stomach, colon and rectum) and cancer of the larynx.

Other Asbestos-Related Conditions: A number of less serious effects have been associated with asbestos exposure: pleural plaques, asbestos bodies and warts. Pleural plaques are areas of scarring of the pleural surfaces. In general, they are not associated with any functional abnormality and are merely an indicator of asbestos exposure. Occasionally, they can become so widespread that they restrict lung function. Asbestos bodies, also termed "ferruginous bodies", result when asbestos fibres become coated with a substance containing protein and iron. The asbestos bodies are not harmful and, like pleural plaques, serve as evidence of asbestos exposure. Asbestos warts are harmless skin growths that occur when asbestos fibres penetrate the skin.

2. An Overview of the Regulation

Essentially, the regulation requires all work with asbestos, (except work to which O. Reg. 570/82 applies), to be conducted according to one of several procedures. These procedures are outlined in sections 11, 12, 13 and 14 of the regulation. The procedure to be followed will depend on the type of work, and, in section 9, the regulation contains instructions on how work with asbestos is to be classified.

Where demolition, alteration or repair work is to be carried out on a building, machinery, a ship or a vehicle, the owner, before arranging for the work, must determine if friable material containing asbestos will be disturbed by the work. This requires an inspection as prescribed by section 7. An inspection is not required if it is known that the material in question does not contain asbestos or if the material is to be handled as if it does contain asbestos and the most stringent procedures for the type of operation are to be followed. In addition, a report is to be provided to all potential contractors who may work on the project; this report is to state whether the friable material that will be handled does or does not contain asbestos. No report is required if the work is to be done as if the material contains asbestos and the most stringent procedures for the type of operation are to be followed.

An important part of the regulation deals with buildings. Under section 5, an owner of a building known to contain friable asbestos-containing material is required to establish a maintenance program for asbestos in the building. This program must include:

- preparation and maintenance of a record of the location of asbestos-containing friable material;
- notification to the building's tenants of the location of such material;
- notification to any workers in the building who may disturb or handle the material that the building contains asbestos;
- establishment of a training program for those employees of the owner who are likely to handle the material;
- periodic inspection of the material to determine its condition.

Where it is apparent that friable asbestos-containing material is deteriorating and falling onto building surfaces, the regulation requires the building owner to take remedial action. The purpose of section 5 is to protect not only maintenance and custodial workers in a building but also occupants of the building.

The regulation contains numerous other provisions. Certain types of work are prohibited or limited by sections 3 and 4. Section 10 lists procedures for respiratory equipment. Instruction and training requirements are outlined in section 15. An asbestos work report form is attached to the regulation, and section 16 requires an employer to complete the form for every worker employed in certain types of asbestos work and to send it to the chief physician of the ministry's Occupational Health Branch. The chief physician, under section 17, is to use the forms to establish an Asbestos Workers Register. In addition, workers are to undergo medical examinations at the discretion of the chief physician. Section 18, the equivalency section of the regulation, allows the use of alternative procedures provided they are adequately protective of workers.

3. Application of the Regulation

There are two ways of looking at the application of the regulation. It can be looked at in terms of the types of work it applies to and in terms of the types of people it applies to. This is all spelled out in subsection 2(1) of the regulation. It can also be looked at in terms of the areas where it does not apply. Subsections 2(2) and 2(3) state to whom the regulation does not apply. It also does not apply to asbestos work that is covered by Ontario Regulation 570/82 (as amended), the Regulation respecting Asbestos.

Where Does the Regulation Apply?

The regulation applies "where material containing asbestos is likely to be handled, dealt with, disturbed or removed." More specifically, it applies to projects, buildings and work on machinery, equipment, aircraft, ships, locomotives, railway cars and other vehicles. It applies to building and project owners, to constructors on a project and to employers and workers engaged in the foregoing types of work with asbestos.

Projects: Construction projects at which asbestos-containing materials may be handled include new construction, demolition projects and renovation and repair work to a building or other structure. In new construction, asbestos-containing materials will be handled for the most part only when manufactured products, such as asbestos-cement pipes, sheets or vinyl asbestos floor tiles, are installed. On demolition projects, asbestos-containing materials that are no longer used in new construction will be found. Of major concern is sprayed-on insulation and fireproofing, and pipe and boiler insulation. The regulation requires such materials to be removed

from a building or structure before it is demolished. Renovation and repair work is similar to both new construction and demolition with respect to the asbestos-containing materials that may be encountered. How asbestos insulation is dealt with may be different, however, because the enclosure or encapsulation of such materials are options that are not available on a demolition project.

The regulation applies to the owner of the project, the constructor, or person who undertakes the project for the owner, i.e. the general contractor, and every employer (contractors and subcontractors) and worker on the project.

Buildings: The regulation applies to buildings in a number of ways. If there is a project in a building or if a building is being demolished, the regulation would apply because, as discussed above, it applies to projects. The regulation also applies to the repair alteration or maintenance of a building where such work is not a project. Buildings that contain asbestos fireproofing or insulation are covered by the regulation even when no work is being done on them.

In section 1, "building" is broadly defined as a structure and its services. This would include residential, office, factory and mine buildings and their plumbing, electrical, heating and ventilation systems. This means that if work is being done on the electrical system, the installation of a light, for example, it would be interpreted as an alteration to the building and, if asbestos were to be disturbed, the regulation would apply.

The regulation applies to the owners of buildings to which the regulation applies and to every employer and worker in such buildings who may have to handle asbestos-containing material. It is important to note that the term "owner", as defined by the Act, includes tenants. In section 5 of the regulation, specific duties are prescribed for tenants; the duties of an owner under section 7 may also become the responsibility of a tenant, where a tenant arranges for work to be done in a building.

Machinery, Equipment, Aircraft, Ships, Locomotives, Railway Cars and Vehicles: The regulation applies to the repair, alteration, maintenance and demolition of machinery, equipment, ships and vehicles. Since the regulation also applies to the repair, alteration and maintenance of a building and since "building" is defined as including electrical, plumbing, heating and air handling "equipment", the question could be asked: when is repair of equipment considered repair of a building and when is it not? This is an important question because, as will be discussed below, the application of the regulation for certain employers will depend on whether work is being done on a building or on equipment. In most cases a distinction can be easily made. Equipment used to provide an essential service to a building is considered part of the building; equipment that is part of an industrial process is not. If, however, the equipment is used for both purposes (a boiler that provides heat for the building and steam for the process, for example), then the equipment is to be considered part of the building.

Where Does the Regulation Not Apply?

Asbestos work where the Regulation respecting Asbestos, O. Reg. 570/82 (as amended), applies is not covered by the regulation. This includes certain work on machinery, equipment, ships and vehicles, as outlined in subsection 2(2), where an employer has an asbestos control program developed under O. Reg. 570/82. The regulation also does not apply to the owner of a private residence or small residential building that is occupied by the owner or the owner's family.

Work Covered by the Regulation respecting Asbestos, O. Reg. 570/82 (as amended): Regulation 570/82 originally applied to all workplaces, except construction projects, where there was an asbestos hazard. Many of these workplaces were to be covered by the new asbestos regulation. To avoid overlap when the new regulation came into force, Regulation 570/82 was therefore amended on March 16, 1986 to restrict its application to the mining

of asbestos, the manufacture of asbestos products and, as will be discussed below, to certain work carried out by workers of an employer who had an asbestos control program developed under Regulation 570/82 in place on December 16, 1985.

Employers with an Asbestos Control Program Developed under O. Reg. 570/82: Subsection 2(2) of the regulation states that alteration, maintenance and repair work to machinery, equipment, ships and vehicles is not covered by the regulation if it is carried out by an employer in accordance with a control program developed under Regulation 570/82, provided the program was in effect on the day Regulation 654/85 was filed (December 16, 1985). Such an employer and the employer's workers are covered by Regulation 570/82. This exception only applies to the employer and workers of the employer. If the same work in the same workplace were to be carried out by outside contract workers, then Regulation 654/85 would apply.

Owners of Residential Buildings: Subsection 2(3) states that the regulation does not apply to the owner of a private residence or residential building of four units or less if occupied by the owner or the owner's family. This does not mean that the regulation does not apply to the building. If work is undertaken in a home by a contractor and asbestos is being handled, then, under subsection 2(1), the regulation applies. But the owner would not be subject to the duties prescribed for an owner in sections 5 and 7.

4. Prohibitions and Limitations

Two applications of asbestos are prohibited under section 3 of the regulation:

- the spray application of asbestos-containing materials that may become friable;
- the installation of material containing asbestos *e.g.* pipe or boiler insulation.

The regulation also prescribes limiting conditions on when friable asbestos-containing materials can be encapsulated (subsection 3(3)) and on how demolition is to be carried out when such materials may have to be disturbed (section 4).

Prohibitions on the Spray Application of Asbestos

The spray application of asbestos fibre insulation can generate quite high airborne levels of asbestos. This is a hazard to the workers who apply the material. However, if the applied material is friable or can become friable, there will be a continuing hazard to demolition, renovation, maintenance and custodial workers who may have to deal with it in the future. While it may be true that the workers applying the material can be easily protected, the same cannot be said for workers who may handle it later. As well, the presence of asbestos-containing insulation in a building requires constant vigilance to protect the occupants of the building. It is because of these ongoing problems and the ready availability of substitutes that the spray application of asbestos has been banned.

It should be noted, however, that there are conditions imposed on this prohibition. It applies only to materials that can become friable. Some asbestos-containing materials can be applied by spraying (autobody underseals, for example) because they do not become friable, release fibres and constitute a hazard. The prohibition is also limited to materials that contain more than one per cent asbestos. One per cent asbestos is considered to be the practical limit of detection for asbestos in a bulk sample of building material.

Prohibition of Asbestos Pipe or Boiler Insulation

Asbestos-containing pipe and boiler insulation leads to the same kinds of problems encountered with sprayed asbestos materials. While the installation of pipe and boiler insulation may not be as hazardous as the spray application of asbestos, the heat from the pipe or boiler causes the installed insulation to become increasingly fragile. The removal of old insulation could therefore generate more dust than did the original installation. Damage to, or deterioration of, the insulation could also endanger building occupants. It is because of this continuing hazard that the further installation of such materials has been prohibited. As with sprayed materials, the prohibition is limited to insulation containing more than one per cent asbestos, the practical detection limit for asbestos in such materials.

Limitation on Encapsulation

The term "encapsulation" refers to the application of a bonding agent, or sealant, to asbestos-containing material. There are two types of sealant:

- Penetrants penetrate and harden the material.
- Bridging sealers produce a tough, impermeable coating on the surface.

Although encapsulation can be a practical method to control the release of asbestos fibres, certain limitations make it useful in a relatively small number of cases. Situations where an encapsulant should not be used are spelled out in subsection 3(3) of the regulation.

A liquid sealant must not be applied to material that has visibly deteriorated. Damaged insulation may be blown off by the sealant application. The insulation must also be strongly attached to underlying surfaces. If delaminated, the material will be pulled down by the additional weight of the sealant.

Demolition

Friable asbestos-containing material in a building is a potential hazard whenever work has to be performed that may disturb it. Demolition work is no exception. Although protection of the building occupants is not a consideration in the case of demolition, the health of workers on the site and the general public outside the site, is. The only way both workers and the public can be protected is if friable asbestos-containing materials are removed prior to demolition. This argument applies as well to machinery and equipment, ships and vehicles. Section 4 of the regulation therefore makes prior removal of these materials a necessary condition for proceeding with demolition. In certain cases, particularly buildings, some demolition may be necessary to gain access to the asbestos-containing material. This is permitted under subsection 4(2).

5. Classification of Work

A key feature of the regulation is the classification of the work. Section 9 requires all work with asbestos to be classified into one of three categories (shown in Table 1). It is the classification of the work that determines what other provisions of the regulation come into effect; for example, notification requirements (section 8), work procedures (sections 11, 12, 13 and 14) and medical surveillance and record keeping (section 16). As the classification of the work goes from Type 1 to Type 3, the corresponding requirements of the regulation become increasingly demanding. The regulation does not specify who is to do the classification, but, in most cases, it would be the employer.

The three work categories have been established according to the asbestos hazard they present, both to those doing the work and to others outside the work area. They can be thought of as being of high, medium and low hazard. In evaluating the hazard, two considerations are of overriding concern: the airborne concentrations of asbestos that will be generated by the work and the duration of exposure. Factors that affect the level of airborne asbestos include: the nature of the asbestos material, how the work is performed and the availability of controls to limit exposure.

Type 1 Operations: Asbestos-containing materials can be divided into two groups on the basis of their friability. Friable materials are easily crumbled and can readily release fibres, and, therefore, work with such materials is classified as Type 2 or Type 3. In non-friable materials, a binder such as cement, vinyl or asphalt is used to hold the product together. Products made from non-friable material will generally release fibres only when they are cut, shaped, or otherwise

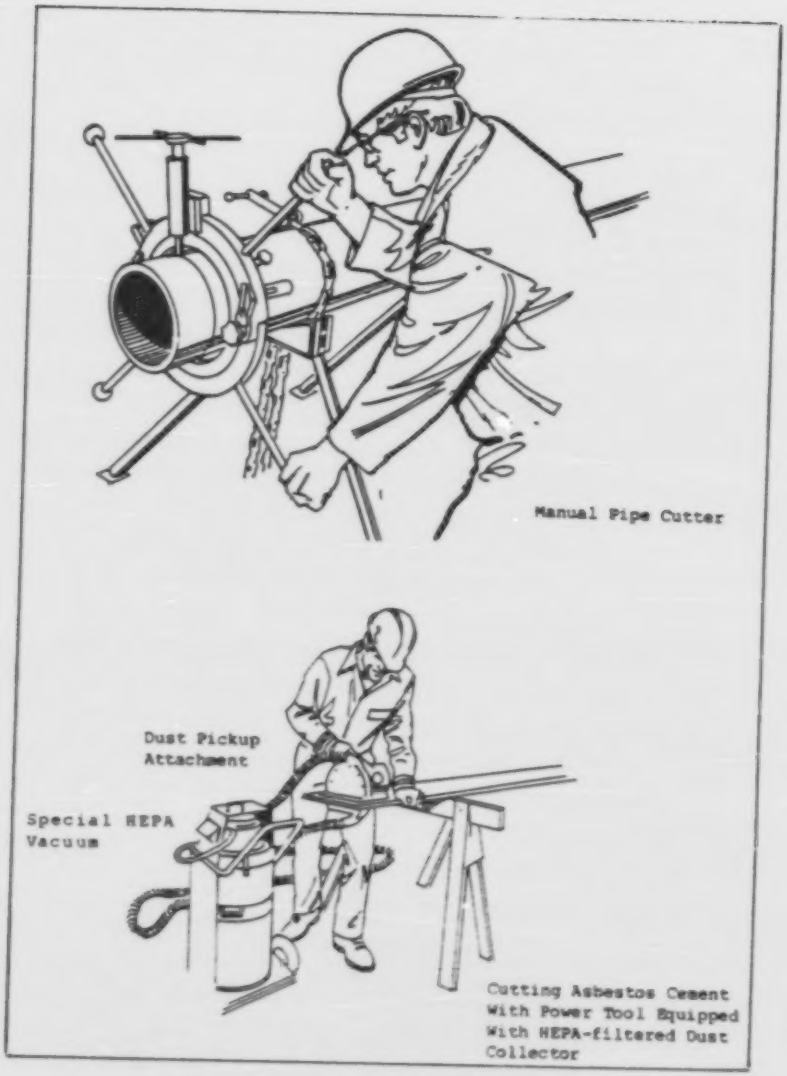
Manual Pipe Cutter
Dust Pickup Attachment
Special HEPA Vacuum
Cutting Asbestos Cement With Power Tool Equipped With HEPA-filtered Dust Collector

FIGURE 2 TYPE 1 OPERATIONS

TABLE 1

Classification of Asbestos Work

Type 1

- installation or removal of manufactured asbestos products
- cutting and shaping of asbestos products with hand tools
- cutting, grinding or abrading an asbestos product with a power tool equipped with a dust collection device and HEPA filter
- drilling a manufactured asbestos product
- drywall removal where asbestos joint filling compounds were used

Type 2

- the removal of a false ceiling with a significant quantity of friable asbestos-containing material on its surface
- minor removal or disturbance of friable asbestos-containing material
- enclosure of friable material containing asbestos
- application of tape, a sealant or other covering to pipe or boiler insulation containing asbestos
- work with asbestos not classified as Type 1 or Type 3

Type 3

- removal (other than minor removal) of friable asbestos-containing material
- spray application of a sealant to friable asbestos-containing material
- cleaning or removal of air-handling equipment in a building that has sprayed fireproofing containing asbestos
- repair, alteration or demolition of a kiln or furnace made, in part, of asbestos-containing refractory materials
- cutting, grinding or abrading an asbestos product with a power tool not equipped with a dust collection device and HEPA filter
- repair, alteration or demolition of a building in which asbestos products were manufactured

worked. The installation and removal of such products is classified as Type 1. How these products are worked on will affect the extent of fibre release. The use of hand-powered tools results in low levels, and such work is classified as Type 1. The use of some power tools may generate significant levels of airborne asbestos, and, therefore, such power tools must be equipped with a dust collection device and a HEPA* filter if the work is to be classified as Type 1. Drilling of non-friable materials, even with a power drill, produces relatively little fibre release and so is also classified as Type 1. The only other Type 1 operation is the removal of drywall where asbestos joint filling compounds have been used.

Type 2 Operations: Work with friable asbestos-containing material is classified as Type 2 or Type 3. An essential difference between Type 2 and Type 3 operations is the duration of exposure. Work that is of short duration is generally classified as Type 2. This is important to remember because some judgement may have to be exercised in distinguishing certain Type 2 and Type 3 operations. For example, minor removal of friable material is to be classified as Type 2, whereas removal that is not minor is Type 3. What is the difference? An important difference is how long it takes to do the removal; but this does not mean that one Type 3 removal can be subdivided into several smaller Type 2 removals. Type 2 removals will generally be associated with jobs that just happen to involve some action on asbestos-containing materials, such as the removal of insulation to attach a fastening device or to gain access to a pipe. A second Type 2 operation requiring some judgement in classification is the removal of a false ceiling where a "significant" quantity of friable material may be lying on the ceiling surface. What is significant? "Significant" refers to visible quantities usually associated with the deterioration of sprayed insulation. If a building

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* "HEPA Filter" is defined, in section 1 of the regulation, as a filter that is 99.97 per cent efficient in removing from the air particles with a diameter greater than 0.3 μm.

owner, through a regular housekeeping program, keeps the upper surface of the ceiling clean, the regulation would not apply to work that is carried out above the ceiling as long as such work does not involve disturbance of asbestos. The other Type 2 operations are straightforward: the enclosure of asbestos-containing friable material and the application of a sealant, tape or other covering to asbestos-containing pipe or boiler insulation. These jobs should be of short duration and result in relatively low asbestos levels. However, if a sealant is applied by spraying, high airborne asbestos levels can be generated, and the work would be classified as Type 3.

Type 3 Operations: Work with friable asbestos-containing material that is of relatively long duration or work that generates high asbestos levels is classified as Type 3. Of chief concern are asbestos removal projects. When this work is carried out in a building, it is a potential hazard to both workers involved in the work and other occupants of the building. The spray application of a sealant to friable asbestos-containing material and the use of power tools that are not equipped with a HEPA filter and a dust collection device usually involve short exposures, but to high levels of asbestos, and so are classified as Type 3. The other three Type 3 operations mentioned in the regulation all involve work of long duration with a potential for high exposure.

Unclassified Operations: Problems in classifying asbestos work may arise either because the regulation does not say how a particular job is to be classified or because there is a disagreement on what the regulation does say. Any work with asbestos that is not mentioned in the regulation as Type 1 or Type 3 is to be classified as Type 2 (see subclause 9(1)(b)(v)). Disputes regarding the classification can be referred to a Ministry of Labour inspector by anyone involved in the dispute. The inspector will then investigate and provide a written decision.

6. Procedures

About half the regulation consists of the protective measures to be taken and the procedures to be followed when working with asbestos. These will depend, for a particular work operation, on how the work is classified. Section 11 prescribes procedures for Type 1 operations. Brake repair is probably the most common Type 1 operation, and a procedure for working with asbestos-containing friction materials can be found in Appendix 7. Measures and procedures that are common to Type 2 and Type 3 operations are outlined in section 12. Section 13 contains procedures for Type 2 operations that are additional to those in section 12. Three sets of work procedures are outlined in section 14; they are for the following Type 3 operations:

- work with power tools not equipped with an effective dust collection device and HEPA filter;
- asbestos removal work outdoors;
- all other Type 3 operations.

The procedures required for each operation type can be divided into five categories:

- steps to be taken in preparing the work area;
- measures to control the spread of airborne dust from the work area;
- requirements for the use of protective equipment (respirators and protective clothing);
- procedures to be followed in cleaning up the work area and disposing of asbestos waste;
- requirements for washing facilities.

Within each category, the required measures and procedures become more demanding as the exposure risk of the work (and therefore the classification) increases. This will become clear in the discussion of each category, which follows. Checklists of the measures and procedures required for each type of operation can be found in Appendix 3. These checklists can be used for determining compliance with the regulation.

A. Preparation of the Work Area

Type 1 Operations

For Type 1 operations the only requirement before beginning work is the removal of any visible dust from surfaces in the work area if the dust is likely to be disturbed. The dust is to be removed either with a damp cloth or a vacuum* equipped with a HEPA filter. Compressed air must not be used for this purpose.

Type 2 Operations

Except for asbestos work that is not specifically mentioned in the regulation (which is therefore classified as Type 2 under subclause 9(1)(b)(v)), all Type 2 operations deal with friable asbestos-containing material. Before commencing this type of work, any crumbled, pulverized or powdered asbestos-containing friable material that is likely to be disturbed and that is lying on any surface or object in the workplace must be cleaned up and removed. As with Type 1 operations, the clean-up and removal is to

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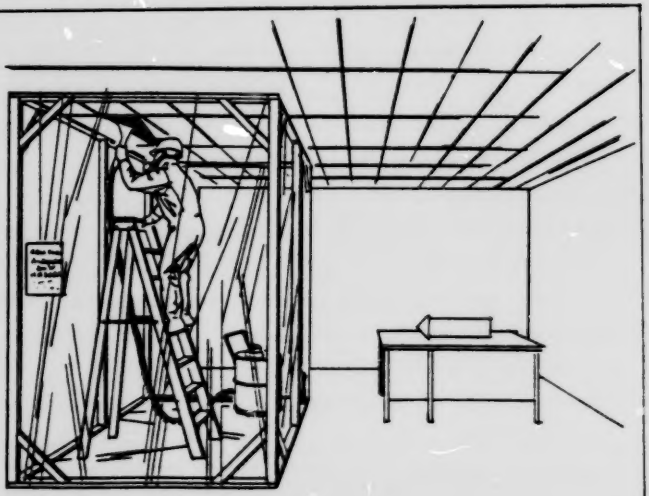
* Note: Whenever dust or debris that might contain asbestos is to be vacuumed, the regulation requires the vacuum to be equipped with a HEPA filter. Use of a vacuum that is not so equipped may result in hazardous levels of airborne asbestos because ordinary vacuum filters are unable to remove small asbestos fibres, with the result that these fibres are blown into the air through the vacuum exhaust outlet.

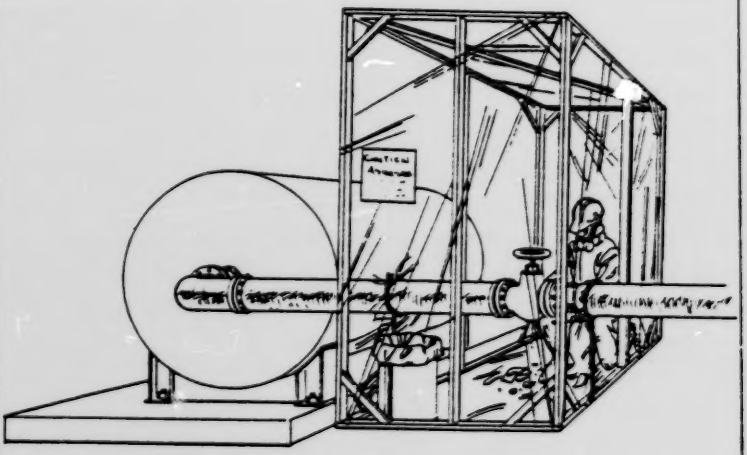
be either by damp wiping or by vacuuming with a HEPA filter-equipped vacuum, not with compressed air. If the Type 2 operation involves the removal of a false ceiling, it obviously will not be possible to clean the surface of the ceiling tiles until at least one has been removed. In this case the friable material must be cleaned up and removed as soon as access to the work area (the ceiling space) has been obtained.

The rest of the procedures for preparing the work area for Type 2 operations apply only to work above a false ceiling or work involving the minor removal or disturbance of asbestos-containing friable material. For these operations, the work area is to be identified by clearly visible signs that warn of the asbestos dust hazard. The mechanical ventilation system serving the work area is to be disabled, where practicable, and inlets or exhausts within the work area sealed off. If the work is to be carried out indoors and if the work area is not enclosed by walls, then an enclosure of polyethylene or similar material must be constructed, where it is practicable to do so (see Fig. 3).

It is important to note the different meanings of the terms "practicable" and "practical". The regulation requires the disabling of the ventilation system and the erection of an enclosure, where practicable. "Practicable" means "feasible", "possible" or "doable". What the regulation is saying, then, is that if it can be done then it must be done. But being able to do something does not make it useful in practice (i.e. practical). While it may be practicable to shut down the ventilation system in a building in order to work in one small area of it, it may not be practical to do so (at least, while the building is occupied). If there is no practical way to comply with the regulation, it may be necessary to apply for a variance under section 18.



Work Above a False Ceiling



Pipe Insulation Repairs

FIGURE 3 TYPE 2 ENCLOSURES

Type 3 Operations (Preparation of the Work Area)

There are three sets of procedures for Type 3 operations. All Type 3 operations are to be identified by signs that warn of the asbestos hazard. The signs must also state that access to the work area is restricted to persons wearing protective clothing and equipment. For work with power tools that are not equipped with an effective dust collection device and HEPA filter, an enclosure of polyethylene or other suitable material is to be constructed, unless walls already enclose the work area. The entrances and exits to the enclosure must be fitted with plastic sheets on each side (see Fig. 4). Where asbestos removal work is to be carried on outdoors, the work area is to be separated by barricades, fencing or some other means (see Fig. 4). If it is a wet removal, then temporary electrical systems must be equipped with ground fault circuit interrupters. For other Type 3 operations more elaborate measures must be taken in preparing the work area.

Type 3 operations, other than the two mentioned above, are conducted inside buildings, which may be occupied, and therefore require stringent measures to prevent the spread of asbestos dust to areas of the building beyond the work area. The ventilation system must be shut down and all vents, air ducts and other openings to or from the work area, sealed. This can be done with 6-mil polyethylene and duct tape. Polyurethane foam is also useful to seal areas that are difficult to tape. Any items in the work area that can be moved (e.g. furniture, equipment, machinery, carpeting, curtains) should be cleaned of visible dust and debris and taken out of the work area. Again, cleaning should be done by wet wiping or vacuuming with a HEPA-filtered vacuum.

Items not being removed must be cleaned and sealed in polyethylene or other suitable material. Where existing walls are unsuitable, the work area must be isolated by constructing an enclosure to prevent the spread of dust from the work area. Even where the work area is enclosed by walls it may be advisable to line the walls and floors

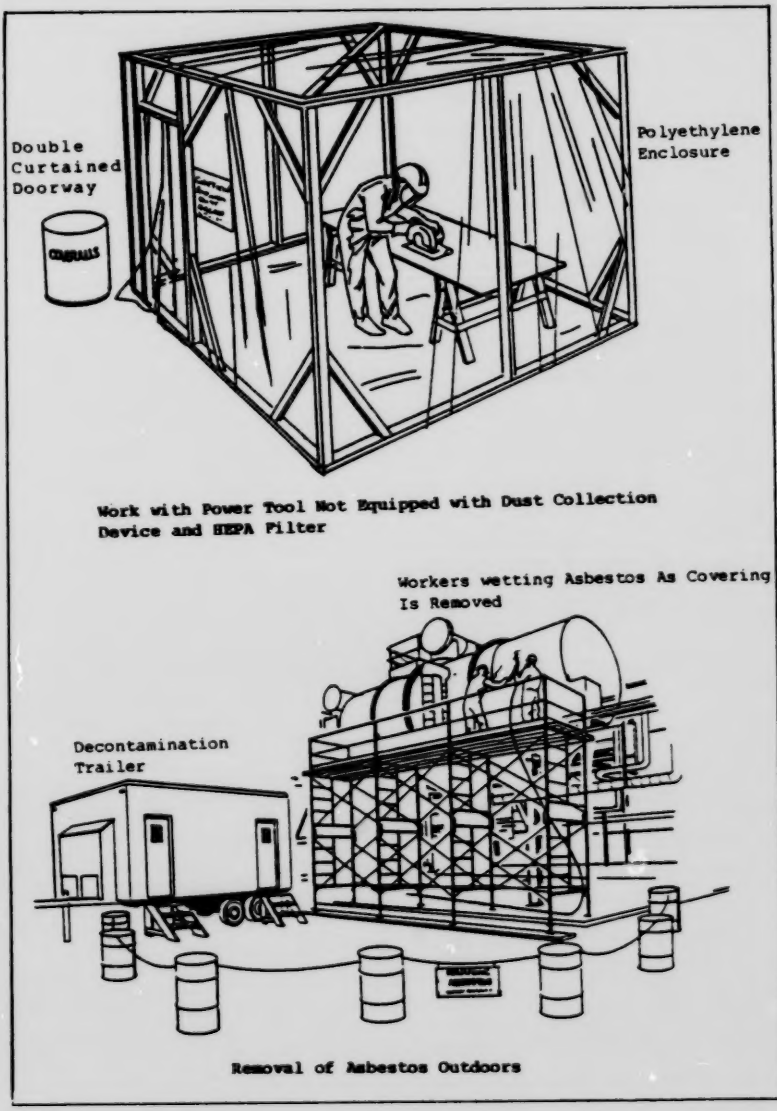
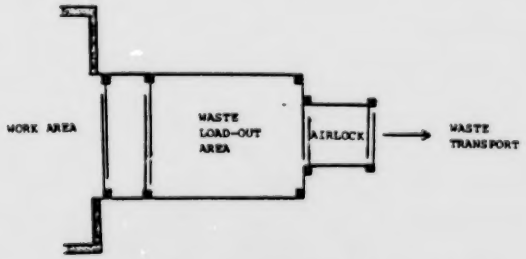


FIGURE 4 TYPE 3 WORK AREAS

with plastic sheeting to facilitate the clean-up and to prevent damage to the architectural finishes.

In making the enclosure, the entire floor area should be covered with 6-mil polyethylene sheeting, cut slightly larger than the floor so as to extend a short distance up the walls. Two layers are recommended. Walls can be made with 4-mil polyethylene, hung so as to overlap with the floor sheet. The seams should be sealed with adhesive duct tape. A decontamination facility must be built into the enclosure so that any one entering or leaving the enclosed work area must use the decontamination facility. Although not required by the regulation, it may be desirable to construct a waste load-out area to transfer asbestos-containing waste from the work area for eventual disposal at a landfill. The waste load-out area consists of a room built into the enclosure, but separated by airlocks from the work area and the area outside the enclosure as shown below:



Curtain doorways made from overlapping polyethylene sheets are used to form the air locks. Waste containers are cleaned of gross contamination in the work area and then placed in the waste load-out area. When a load has accumulated, the room can be sealed off from the work area and the waste transferred to a truck for transport to a landfill.

The decontamination facility is to consist of three rooms: a clean room, a shower room and an equipment room. A typical decontamination facility is shown in Fig. 5. The doorways between rooms in the decontamination facility must be fitted with curtains of polyethylene (or other suitable material) on each side so that they

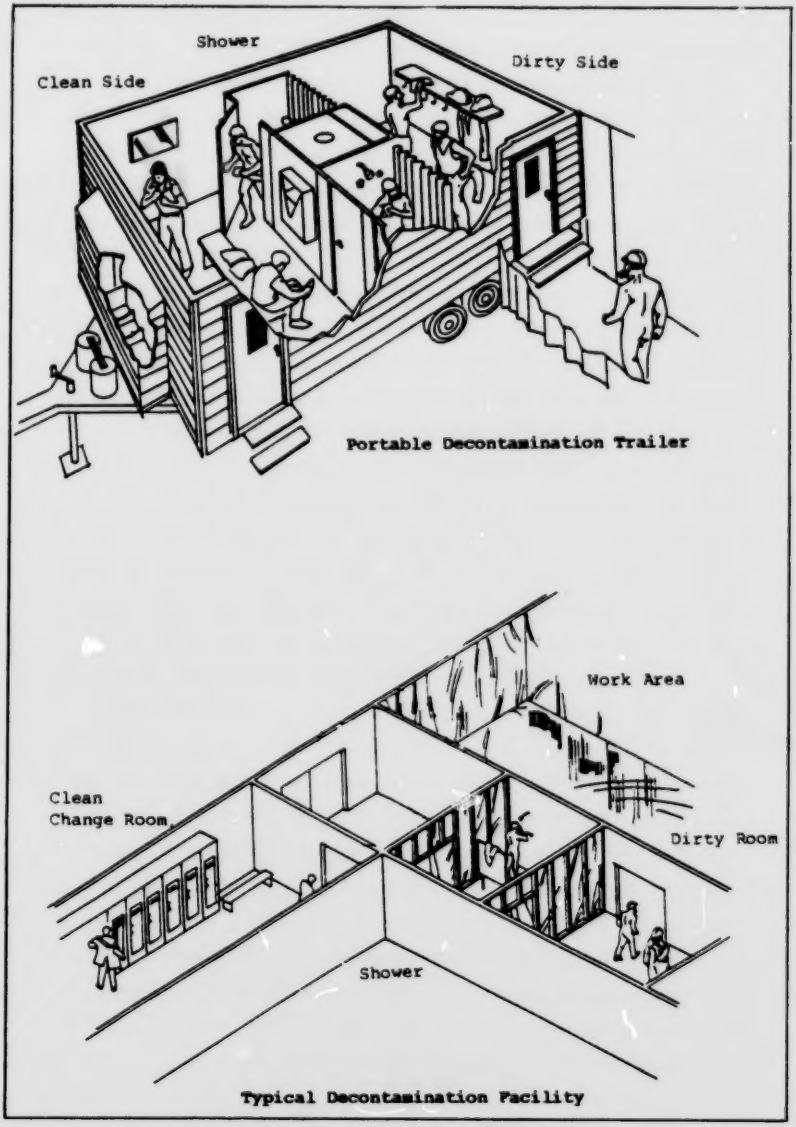


FIGURE 5 DECONTAMINATION FACILITIES

will close behind workers as they pass through the doorways. This is to minimize the flow of asbestos-containing air from the work area.

Clean Room: This room is to be used for changing into uncontaminated protective clothing, putting on respiratory equipment, storing clean clothing and, after showering, for dressing in street clothes. No asbestos-contaminated items should be brought into this room. The clean room could be furnished with benches, lockers for clothes and valuables, and hooks for hanging respirators.

Shower Room: The shower room should be located between the clean room and the equipment room. This will ensure that workers leaving the contaminated equipment room must pass through the shower room in order to enter the clean room. A temporary shower can be installed using prefabricated shower stalls with catch pans and sump pumps. Hot and cold water supplies should be available nearby in most buildings. For hot water lines, high quality rubber hose should be used to prevent bursting and leakage. The shower must be supplied with both hot and cold water or with warm water of a constant temperature between 40° and 50° Celsius. The shower must have individual controls to regulate the water flow and, if there is hot and cold water, to regulate the temperature. The regulation does not specify a minimum number of shower heads; however, there should be sufficient showers to avoid delays. Having to wait for access to a shower could cause some individuals to rush through the decontamination procedure or to skip it altogether. The shower room must also be equipped with clean towels and should be heated to a comfortable temperature.

Equipment Room: Contaminated work clothes, footwear, hard hats, goggles and other equipment should be stored in an area adjacent to the shower room. This area is also to be used for workers to remove contaminated clothing prior to entering the shower.

A decontamination facility is also required for Type 3 asbestos removals that are conducted outdoors. It should have the same

features as the facility for indoor work, but is to be located "as close as practicable" rather than adjacent to the work area. Customized trailers outfitted with three room decontamination facilities are available (Fig. 5). These units can be moved from one work site to the next and may be useful for both outdoor and indoor work.

Where wet removal of asbestos is to be carried out, electrical safety is an important consideration. The use of wet methods increases the potential for electrical shock when working around electrical panels, conduits, light fixtures, junction boxes and other electrical items. Where practicable, existing electrical power distribution systems that are not watertight must be de-energized and locked out before work begins. Where this is not feasible, dry removal methods should be used in areas immediately adjacent to energized equipment. If a temporary power system has to be set up to operate tools and equipment, it must be equipped with a ground fault circuit interrupter.

B. Dust Control Measures

There are three aspects to the control of asbestos dust:

- generation control;
- containment;
- exposure control.

The generation of dust must be controlled to minimize the amount that becomes airborne. Once dust is generated, steps must be taken to control its spread beyond the work area. Workers must also take precautions to control their exposure within the work area.

The generation of airborne asbestos fibres can most easily be controlled by using wet methods when handling asbestos-containing materials. Keeping such materials wet not only reduces the number of fibres that get into the air but also increases the settling rate of

fibres that are released. However, ordinary water does not penetrate asbestos very well. For wetting to be effective, a wetting agent should be added to the water. A wetting agent is a combination of chemicals that aids in the penetration of the material and increases the probability of individual fibre wetting. A wetting agent can be any of a number of non-ionic surfactant materials. Examples are dishwasher detergent (one cup in 30 gallons of water) or a 50/50 mixture of polyoxyethylene ester and polyoxyethylene ether applied at the rate of one ounce per five gallons of water. Water that contains a wetting agent is often called "amended water". The regulation requires the use of amended water to control dust generated by Types 2 and 3 operations.

There are numerous measures in the regulation for controlling the spread of dust from the work area. The wearing of protective clothing and the use of washing facilities are intended to prevent workers from transporting fibres from the work area. Restricting access to the work area keeps persons not involved in the work from doing the same thing. The stringent clean-up requirements of the regulation prevent the spread of dust after the work is completed. What will be discussed below are the dust control measures to be taken while the work is in progress. Most important is the use of enclosures.

Worker exposure is to be controlled, for the most part, by respirators. The regulation also prescribes certain hygiene measures to increase worker protection. Eating, drinking, chewing and smoking are prohibited during all three types of asbestos work, for example.

Type 1 Operations

Where the Type 1 operation involves work on a manufactured asbestos-containing product, the product is to be wetted unless wetting creates a hazard or causes damage. The spread of dust from the work area is to be controlled by appropriate measures; in most

cases this would be a drop sheet of polyethylene or other suitable material. Protective equipment should not be necessary to control worker exposure to asbestos in a Type 1 operation, but a suitable respirator is to be provided if requested by a worker. A worker who requests a respirator for a Type 1 operation must then wear it.

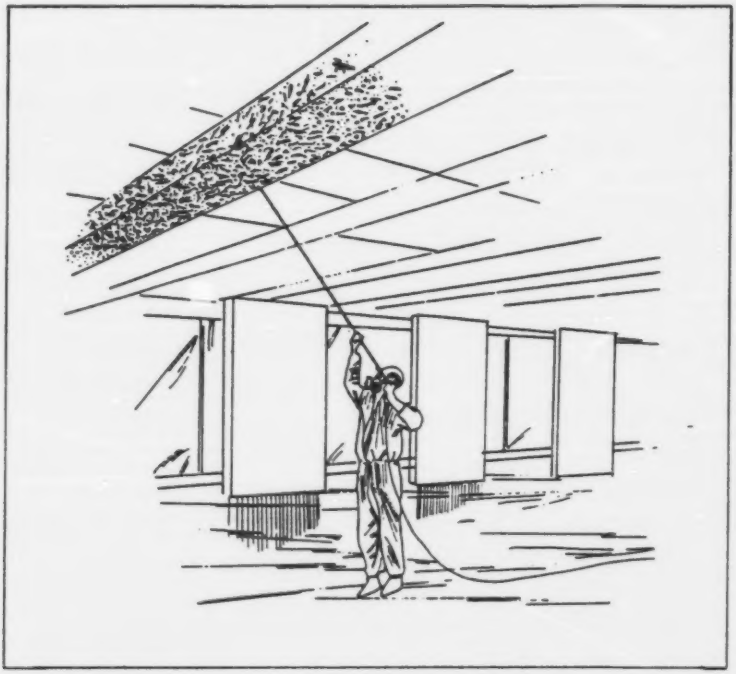


FIGURE 6 WORKER SPRAYING AMENDED WATER ONTO ASBESTOS MATERIAL

Type 2 Operations

As with Type 1 operations, the procedures for Type 2 operations rely on the use of wet methods to control the generation of asbestos dust unless wetting creates a hazard or causes damage. But for Type 2 operations the water used must be amended with a wetting agent.

Drop sheets can be used to control the spread of dust; however, for work above a false ceiling or work involving the minor removal or disturbance of asbestos-containing friable material, the work area must also be surrounded by an enclosure, where practicable (see Fig. 3). Workers in a Type 2 operation are to wear protective clothing to prevent the transport of asbestos from the work area and must be supplied with an appropriate respirator.

Type 3 Operations

Type 3 work with a power tool that is not equipped with an effective dust collection device and HEPA filter must be conducted in an enclosed area to control the spread of dust (see Fig. 4). Entrances and exits to the work area are to be fitted with plastic sheets on each side. Workers are to wear protective clothing and a powered air purifying positive pressure dust respirator suitable for protection against asbestos.

For asbestos removal work outdoors, containment is not so critical and enclosures are not required. Nevertheless, other dust control measures must be taken. Where it is feasible, wet methods are to be used unless wetting creates a hazard or causes damage. Asbestos waste must not be permitted to fall freely from one work level to another. Workers must wear respirators and protective clothing. A decontamination facility equipped with a shower is to be used by every worker leaving the work area.

For all other Type 3 operations, an enclosure with a built in decontamination facility (as described previously) is required. The decontamination facility must be used by every worker when leaving the work area. The enclosure is to be inspected for defects on at least a daily basis, and work is only to continue when all defects have been repaired. Otherwise, the dust control measures are the same as for other types of work. Wet methods are to be used and protective equipment is to be provided to, and used by, workers.

C. Personal Protective Equipment

The personal protective equipment required by the regulation consists of respirators, to control the exposure of workers in the work area, and protective clothing, to prevent workers from transporting asbestos from the work area. To be effective, both must be used correctly.

General procedures for the proper use of respirators are outlined in section 10 of the regulation. In addition, owners (under section 5) and employers (under section 15) are required to ensure that training in the use of respirators is provided to their workers. The respirator requirements of the regulation are more fully discussed in Chapter 10 of this guide. The specific respirator requirements for each type of asbestos work operation are summarized in Table 3 (page 75).

Protective clothing is to be provided by the employer to all workers on a Type 2 or Type 3 operation. The clothing is described in paragraph 5 of section 12 of the regulation. It must have the following characteristics:

- It must be made of material that does not retain or permit the penetration of asbestos fibres.
- It must include suitable footwear and a head covering.
- It must fit snugly at the wrists, ankles and neck.

Disposable plastic coveralls that meet these requirements are available and are widely used in asbestos work. They can be easily torn, however, and must be repaired or replaced when this happens. What footwear is suitable will depend on the job. High top rubber boots are ideal for wet removal work. Conventional safety boots or safety shoes may be more appropriate for other types of work. The head covering may be a hood attached to coveralls or a separate cap. If the job requires a hardhat, it should be worn over the head covering.

Once the work area has been entered, a worker must not leave it without decontaminating the protective clothing. This can be done with a vacuum equipped with a HEPA filter or by damp wiping. For all Type 3 operations, except those with a non-HEPA filter-equipped power tool or involving outside asbestos removal, the protective clothing, once contaminated, must not be worn outside the work area. Protective clothing that will not be reused must be disposed of as asbestos waste (see below).

D. Clean-up and Waste Removal

Cleaning of the work area begins shortly after the start of work. For all work categories, the regulation requires that dust and waste containing asbestos are to be cleaned up and removed at frequent and regular intervals as the work proceeds. This is to be done with a vacuum equipped with a HEPA filter or by damp mopping or wet sweeping. Compressed air is not to be used. On major removal projects the waste must be kept wet, where this is feasible, and should be placed in containers as soon as possible. This will minimize drying and the chance of generating airborne dust.

The containers to be used for asbestos waste, and described in section 12 of the regulation, must be:

- dust tight;
- suitable for the type of waste;
- impervious to asbestos;
- identified as containing asbestos.

Plastic bags with appropriate labels are commercially available. It is advisable that plastic bags be placed in large fibre drums for transport. The containers must be identified as containing asbestos waste and cleaned on the outside before being removed from the work area. The disposal of asbestos waste is covered by Regulation 309 (as amended) under the Environmental Protection Act. The disposal site should be notified prior to delivery of the waste so that

FIGURE 7 WORKER WITH PROTECTIVE CLOTHING AND RESPIRATOR

necessary preparations can be made to receive the material. Asbestos waste must be removed from the workplace to a disposal site at frequent and regular intervals. All bagged waste should be removed from the work area at least by the end of the work day.

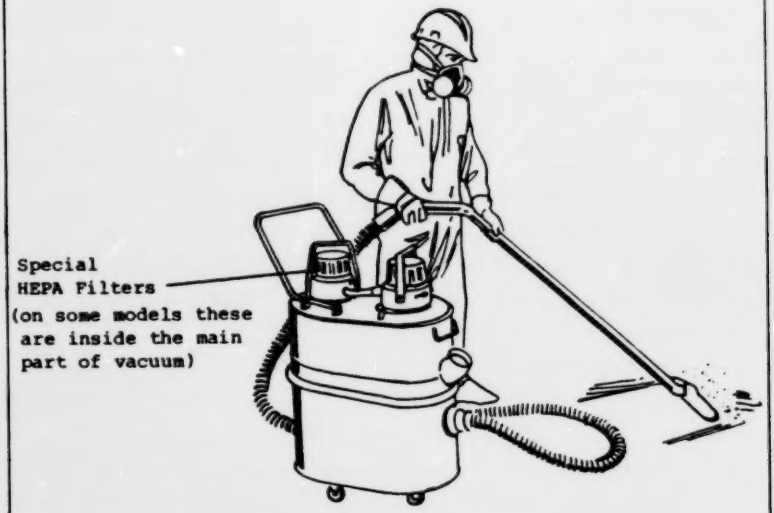
For Types 1 or 2 operations drop sheets and barriers that will be reused must be cleaned with a vacuum equipped with a HEPA filter

or by damp wiping. If they are not to be reused, they must be wetted, folded so as to contain any dust and placed in an asbestos waste container. For a Type 3 operation involving the use of a power tool not equipped with a HEPA filter (as described by subclause 9(1)(c)(v)) barriers and enclosures are not to be reused and must be disposed of as asbestos waste. Where a Type 3 asbestos removal has been conducted outdoors, the work area is to be washed down with water after the job is completed, unless it is not feasible to do so.

For other Type 3 operations, because they are conducted indoors, the final clean-up is a most critical phase of the work. If not done properly, future occupants of the building may be exposed to hazardous levels of airborne asbestos fibres. The regulation requires the work area to be cleaned by a thorough washing, where practicable, and by vacuuming with a vacuum equipped with a HEPA filter. Surfaces from which asbestos insulation has been removed should be brushed to loosen any remaining material and wiped clean. A water-based sealant can be applied to encapsulate any fibres that remain. If the enclosure has been constructed with a double layer of plastic, the inner layer can be removed and discarded, as asbestos waste, without cleaning. Any material that leaked through to the outer layer should be cleaned up and removed. Equipment, tools and other items must be cleaned or, if they are not to be reused, placed in an asbestos waste container before being removed from the work area. The enclosure and decontamination facility are then dismantled. Plastic sheeting must be wetted and disposed of as asbestos waste; it must not be reused.

Although air monitoring is not required by the regulation, it is often used on large asbestos removal jobs in buildings to check that the clean up has been done properly. Clients often specify a maximum airborne fibre concentration (usually less than 0.1 fibre/cm^3) before accepting the area. This may require additional cycles of cleaning with intervening waiting periods (usually 24 hours) to allow the airborne asbestos fibres to settle.

Worker Placing Asbestos Waste in Container



Vacuuming with HEPA Vacuum

FIGURE 8 ASBESTOS WASTE CLEAN-UP

E. Washing Facilities

Washing facilities are required for all types of asbestos work covered by the regulation. Their purpose is to prevent workers from transporting asbestos fibres from the workplace. The washing facilities must therefore be used by every worker when leaving the work area. For Types 1 and 2 operations and for Type 3 operations that involve work with power tools not equipped with HEPA filters (as described in subclause 9(1)(c)(v)), the washroom facilities must allow workers to wash their face and hands. In a building, the regular washroom facilities could be used. For outdoor asbestos removals and other Type 3 operations, a decontamination facility equipped with a shower must be provided.

Where a decontamination facility has been provided, the following procedure must be adhered to by every person leaving the work area. All protective clothing (coveralls, boots and head covering) and all protective equipment (hardhat, safety goggles) except the respirator is removed in the equipment room. The shower is then entered, the facepiece of the respirator is rinsed off and the respirator is removed. If a powered air purifying respirator is worn, care should be taken to keep the filters dry; the filter unit and power pack should be wet wiped rather than placed under the shower. Non-powered respirators should be thoroughly washed and, in the case of a filter respirator, the filter cartridges should be soaked in the shower and disposed of on the dirty side of the shower. Disposable respirators should also be disposed of as asbestos waste. An exit is then made with the respirator from the clean side of the shower, where street clothes or a new set of coveralls can be put on.

F. Additional Measures and Procedures

The measures and procedures prescribed by the regulation are considered to be the minimum requirements necessary for safeguarding the health of workers and future occupants of areas

where asbestos work has been carried out. For certain operations, particularly large jobs, additional precautions may be advisable. The regulation should in no way be interpreted as precluding the adoption of such measures. Two of the most commonly used measures, air monitoring and negative air filtration, are discussed below.

Air Monitoring

Air monitoring refers to a procedure for determining the concentration of airborne asbestos in and around the workplace. It involves two steps: air sampling to capture fibres on a filter and laboratory analysis of the samples to determine the quantity of asbestos. **Because of the highly variable conditions on construction projects and the difficulty of obtaining representative samples, the regulation has no air monitoring requirements.** There are, however, some situations where air monitoring can provide useful information. These are, in order of decreasing importance:

- at the end of a project to determine if the clean-up has been adequate;
- outside an enclosure to ensure that asbestos contamination is being contained;
- long-term Type 3 operations where close to steady state conditions prevail.

Each of the three situations is discussed below.

Final Air Sampling: Samples are taken at the conclusion of the project after a visual inspection indicates that all asbestos-containing material has been removed. The purpose of the sampling is to capture any fibres that remain. This is accomplished by a technique called aggressive sampling. Fans or other forced air equipment are used to circulate the air artificially so that fibres remain airborne during sampling.

Sampling Outside an Enclosure: Air monitoring outside an enclosure is particularly valuable on Type 3 operations where the work is being done in a building occupied by unprotected people. Samples should be taken at potential leakage points around the perimeter of the containment barrier, down-stream from the exhausts of negative air machines, near the load-out area and in the clean change room of the decontamination facility.

Long-term Type 3 Operations: Samples taken within the work area on a Type 3 operation can provide a check on the effectiveness of the dust suppression techniques being used and, therefore, on the adequacy of the respiratory protection. The respirator requirements of the regulation assume that the prescribed dust control measures are being properly carried out. If, for example, asbestos-containing material was not being properly wetted or waste was left lying around and allowed to dry out, higher than expected asbestos levels could result. Samples should be taken from within the breathing zone of a worker early in the project so that adjustments can be made if necessary. Additional samples could be taken any time the work or material being handled changes.

Three microscopic methods can be used to analyse the samples for asbestos. Phase-contrast microscopy (PCM) is the least expensive method. It uses a light microscope, cannot distinguish between asbestos fibre types and only counts fibres longer than 5 μm and wider than 0.25 μm. Results can be obtained in a few hours. Scanning electron microscopy (SEM) permits identification of smaller fibres, but it is more expensive and may require several days to get results. Transmission electron microscopy (TEM) gives the most complete information on airborne asbestos; however, it is expensive, time-consuming and not widely available.

In contrast to the microscope methods, the fibrous aerosol monitor (FAM) is a device that instantaneously analyses the fibre content of air. While it cannot provide a precise analysis, it can indicate when fibre levels are rising. When used in conjunction with a strip chart

recorder it can provide a continuous record of air quality conditions on a job.

Negative Air Filtration

Negative air filtration is a technique for maintaining the air pressure within the enclosed work area at a level lower than that of the outside environment. One or more exhaust units are used to establish the lower pressure inside the work area. The unit consists essentially of a fan and a series of filters, one of which is a HEPA filter. The fan draws contaminated air from inside the enclosure through the filters and discharges clean air through the exhaust outside the enclosure. Fresh air passes into the work area primarily through the decontamination facility.

The use of negative air pressure offers several advantages. If the enclosure is torn, air will leak into, rather than out of, the work area. This virtually ensures that there will be no asbestos contamination outside of the work enclosure. The concentration of airborne fibres in the work area will be reduced as contaminated air is filtered and exhausted. The circulation of fresh air through the work area may also improve worker comfort by decreasing both the temperature and humidity levels inside the enclosure. While not required by the regulation, the use of negative air filtration is encouraged, especially if the work is being done in an occupied building.

7. Inspection and Notification

The classification of work with asbestos (section 9 of the regulation) and the adoption of the appropriate procedures (sections 11 through 14) assume that asbestos is known to be present. But what if it is not known? This is most likely in the case of demolition, alteration or repair work. In such work, friable asbestos-containing materials are a particular hazard because of their tendency to release fibres. In a building, work with such materials is even more of a problem because any exposure would take place in an enclosed area and there could be a hazard to other occupants of the building. It is therefore essential that, before such work is undertaken, an inspection be made to determine if friable asbestos-containing material will be handled or disturbed by the work that is planned. This will permit the appropriate control procedures to be instituted, if necessary.

Section 7 outlines the duties of an owner to inspect for asbestos, prepare a report and inform a constructor of the presence of asbestos. Similar duties to inform others of the presence of asbestos are prescribed for constructors, contractors and subcontractors. An inspection is not required in every case where the regulation applies, but only where there is friable material that may be disturbed by the work that is planned. The regulation also covers the removal of non-friable manufactured products containing asbestos, such as vinyl or acoustic tiles, but no inspection would be required prior to this type of work unless the work would be likely to disturb pre-existing friable material.

Inspection

When is an inspection required? Subsection 7(1) of the regulation requires an owner to inspect whenever demolition, alteration or repair work is to be undertaken. In most cases the work would be in a building, but this requirement also applies to such work on machinery or equipment, ships and vehicles. The inspection is to take place before the owner asks for tenders or otherwise arranges for or contracts for doing the work.

The inspection is in two parts. First, the work area or what will become the work area is examined for the presence of friable material. Second, if it is likely that this material will be handled or disturbed, it must be tested to determine if it contains asbestos. If it does contain asbestos, the testing will also determine the type of asbestos. If the friable material is known to contain asbestos (or known not to contain asbestos) and the type of asbestos is also known, then it is not necessary to have the material tested.

In a building, the inspection may be simplified by consulting the building records. Such records, although unreliable as evidence that asbestos is not present, may show locations where asbestos has been used. The survey of the building records should be followed by a thorough examination of the future work area.

The inspection should concentrate on walls, ceilings, beams, ducts and other surfaces. Friable insulation may also be found on equipment containing hot air or liquid, such as pipes, boilers, tanks and, sometimes, ducts. Pipe and boiler insulation is usually covered with a protective jacket and often would not have to be tested unless the work involved removal of the insulation. Where friable material that will be disturbed by the work is found and it is not known whether or not it contains asbestos, the material must be sampled for analysis. A procedure for the sampling of friable material is outlined in Appendix 6.

The method of analysis is set out in the Code for Determination of Asbestos from Bulk Samples, which is referenced in section 6 of the regulation. In most cases the analysis is by polarized light microscopy; where this is not possible, X-ray diffraction may be required. Variations from the method in the Code are permitted if the alternative procedure equals or exceeds the factors of accuracy and precision required in the Code and prior written approval is obtained from the director of the Construction Health and Safety Branch (see Chapter 12 of this Guide).

Report

Where there is friable material that may be disturbed by the work that is planned, a report must be prepared by the owner. If the material contains asbestos, the report must name the type of asbestos and show its location in drawings, plans and specifications. If there is no asbestos, a report would still have to be prepared stating that the material does not contain asbestos. Under subsection 7(7), however, an owner may choose not to have the material tested but rather to assume that it contains asbestos (of a type other than chrysotile) and arrange for the work accordingly. If this option is chosen, a report would not be required. There is also no requirement for a report where there is no friable material.

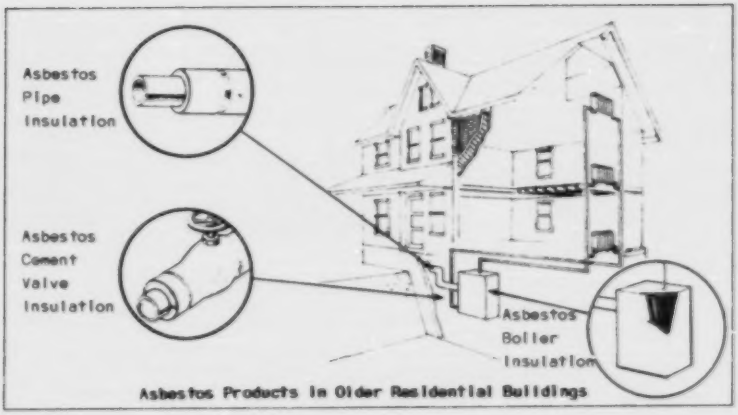
It is important to know the type of asbestos. Types of asbestos other than chrysotile are thought to be more hazardous and are known to give rise to higher airborne fibre concentrations. For these reasons, more stringent respirator requirements are prescribed for Type 3 operations where asbestos other than chrysotile is handled (see section 14 (of the regulation), subparagraphs 5 viii and 6 ix). From this it can be seen that it is not enough to report that asbestos is present; the type of asbestos must also be reported. In the same way, it is not enough to assume the presence of asbestos; it must be assumed to be a type other than chrysotile in order to ensure that the more stringent respirator requirements are followed.

Under subsection 7(3), the owner is required to give a copy of the report (prepared in accordance with subsection 7(1)) to all prospective constructors unless, of course, the owner is a constructor. Similarly, under subsection 7(4), the constructor is required to supply a copy of the report to prospective contractors, and these contractors must do likewise for prospective subcontractors. The intent of these requirements is to allow contractors to make the necessary provisions for worker training and safe work practices. Because these provisions will increase the contractor's costs, the information must be provided when the work is being arranged for so that the costs can be included in the contractor's bid. An owner who, under the provisions of subsection 7(7), elects not to have friable material tested, must still inform potential constructors that the material in question will have to be handled as if it does contain asbestos.

Unexpected Discovery of Friable Material

What if friable material is unexpectedly discovered in the middle of a job? When this happens, all work that will disturb the material must stop, and the nearest local office of the Construction Health and Safety Branch (CHSB) is to be notified, both orally and in writing. The information that is to be provided to the CHSB is listed in subsection 8(2) of the regulation, and is the same information required for all Type 3 operation notifications.

Once the CHSB has been notified, a contractor has two options for continuing with the work. If it is assumed that the material contains asbestos of a type other than chrysotile and the appropriate measures and procedures are adopted, then work can be immediately resumed. Otherwise, the material would have to be tested to see if it contains asbestos. Because it is the contractor who is responsible for carrying out the work according to the prescribed procedures, it is in the contractor's best interest to find out if asbestos is present before bidding on a job. The inspection and report requirements should make it easier for a contractor to obtain this information.



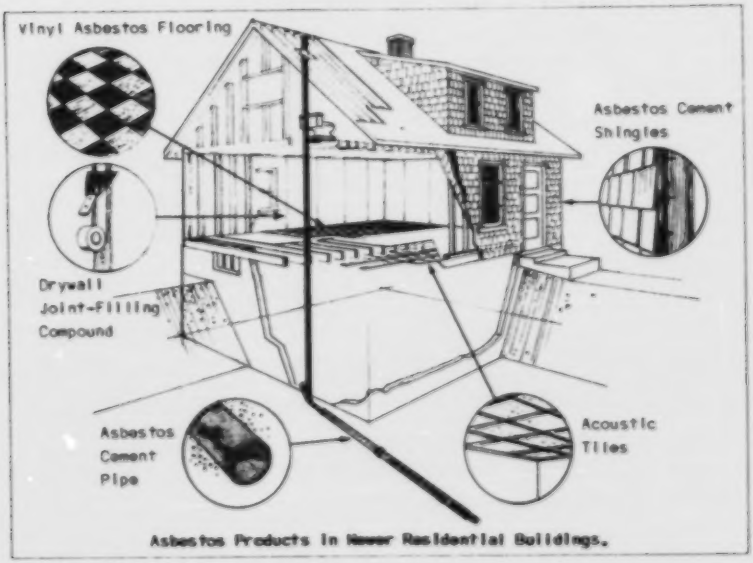


FIGURE 9 ASBESTOS PRODUCTS IN RESIDENTIAL BUILDINGS

However, contractors should be aware that, while the regulation applies to asbestos work in private homes, it does not apply to the owner-occupants of small residential buildings (see subsection 2(3) of the regulation). Therefore, the inspection and report requirements do not apply to these owners, and the onus will be on the contractor to find out if the work in such a building involves handling asbestos (see Fig. 9).

8. Buildings

Asbestos-containing materials have been used in many ways in the construction of buildings (see Figs. 9,10 and 11). These materials can be divided into three classes, depending on their tendency to release asbestos fibres to the air. Since it is the inhalation of such airborne asbestos fibres that can lead to disease, this approach also classifies materials according to their potential hazards.

The first class consists of products used or applied as a liquid. Because the asbestos fibres are combined with or held down by a liquid, the release of fibres is highly unlikely. Products in this class include asbestos-containing paints and asbestos-asphalt roofing compounds.

The second category is hard products in which the asbestos fibres are firmly embedded in a solid material and are unlikely to be released during normal use. Examples include vinyl-asbestos floor tiles, asbestos-cement products, hard ceiling tiles, drywall taping and jointing compounds, and impregnated paper and textile products. Fibres would only be released from these materials during sanding, grinding, cutting or other work on the product during installation, renovation or removal.

The third category is friable asbestos-containing materials. Friable material is defined in section 1 of the regulation as material "... that when dry can be crumbled, pulverized or powdered by hand pressure" and as including such material "that is crumbled, pulverized or powdered". This category includes material that falls apart at the slightest touch, as well as products with a relatively hard surface. These materials can cause substantial exposure when maintenance or

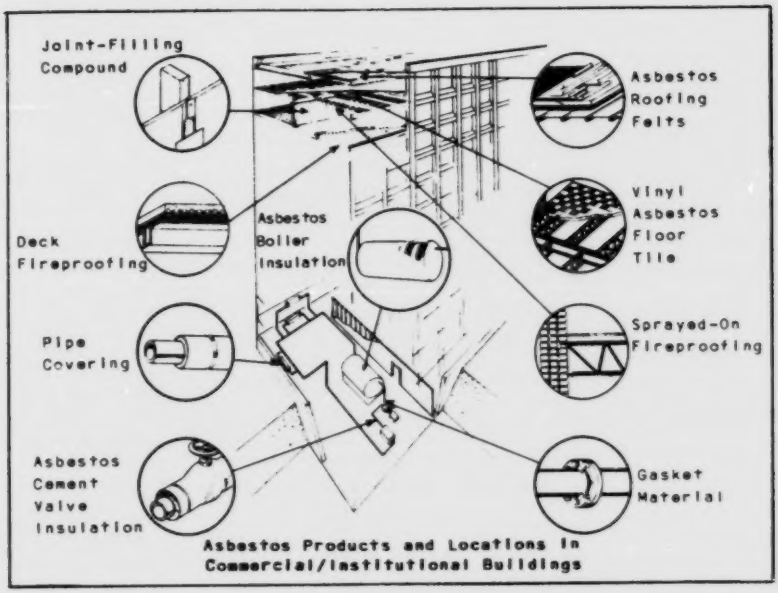


FIGURE 10 ASBESTOS MATERIALS IN HIGH RISE RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL CONSTRUCTION

renovation work is performed that will disturb them or, if they are deteriorating and in poor condition, even when they are not being worked on. Of major concern are sprayed insulation and pipe and boiler insulation.

Sprayed Asbestos-containing Insulation

The spray application of asbestos insulation in Ontario buildings took place, for the most part, between 1950 and 1973. It was used originally for thermal insulation, decorative purposes and acoustical

control, but after 1950 its primary use was as fireproofing to protect structural steel from heat in the case of a fire.

The insulation was applied by either a wet or a dry process. The dry process was more common in Ontario. It resulted in a thicker layer of insulation with a lower density and therefore a greater tendency to release fibres. Another important factor affecting fibre release is the type of asbestos in the insulation. Both chrysotile and amosite were widely used; crocidolite was less common. Greater airborne fibre concentrations are generated where the asbestos is amosite or crocidolite.

The spraying of asbestos-containing insulation materials ceased in 1973 when strict regulations for the spray process were introduced. There are, however, a variety of non-asbestos fireproofing and insulation materials, including sprayed materials, in current use. These materials may be very similar in appearance to asbestos insulation. For this reason, it is necessary to have the insulation tested to determine if it contains asbestos.

Pipe and Boiler Insulation

A variety of products have been used for the insulation of pipes and boilers. Preformed thermal insulating sections or slabs were widely used on pipes, boilers and furnaces from the mid-1920s through to 1972, and less frequently after that date. They usually contained about 15 per cent asbestos. Corrugated asbestos paper, which is almost 100 per cent asbestos, has been made into preformed sections for low-temperature pipe insulation. For irregular fittings such as elbows, Ts and valves, which cannot be covered by standardized preformed shapes, asbestos-containing compounds, rope lagging or asbestos tape have been used. In fact, these asbestos products were often used even where the straight insulating sections did not contain asbestos. A higher proportion of Ontario buildings contain asbestos-containing pipe coverings than contain sprayed asbestos-containing fireproofing.

Once installed, asbestos pipe and boiler insulation is a problem because the heat from the pipe or boiler causes the insulation to become increasingly fragile, and thus more friable, over time. There is therefore a potential for exposure to high levels of asbestos if the insulation becomes damaged or has to be removed.

Application of the Regulation to Buildings

The regulation applies to every building that may contain friable asbestos-containing insulation or fireproofing and it also applies to the building's owner. The responsibilities of the building owner are specified in sections 5 and 7 of the regulation. Section 5 deals with the management of such a building; section 7 outlines how work on the building is to be arranged for.

For the most part, asbestos in buildings is not a hazard. Studies have shown that even in buildings that contain friable asbestos-containing insulation, asbestos levels are only about 0.001 fibre/cm^3.

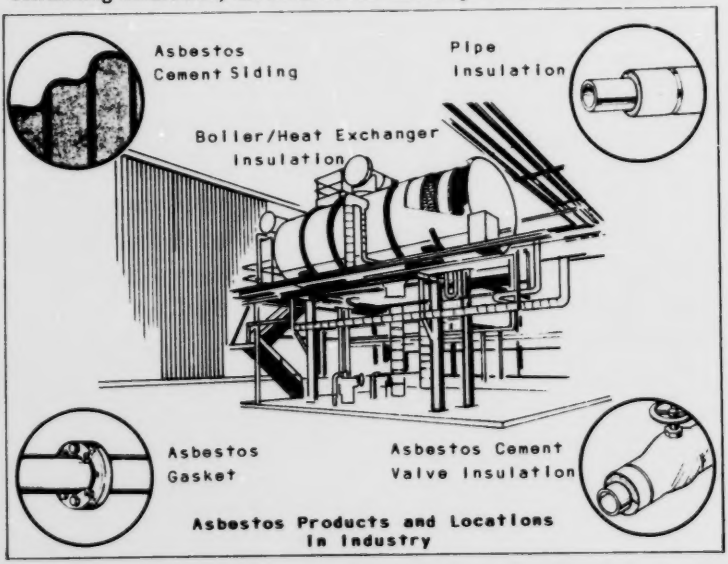


FIGURE 11 TYPICAL INDUSTRIAL LOCATIONS OF ASBESTOS PRODUCTS

While the health risk of working in a building with this level of asbestos is not exactly zero, it is far below the risks faced by most people in their everyday lives. It is, for example, less than 1/50th as great as the risk of daily commuting 10 miles to and from such a building.

While it is generally true that building occupants are at little risk from asbestos in buildings, there are exceptions. These are:

- in the immediate vicinity of work that disturbs friable asbestos-containing insulation;
- where the occupants are within the range of air circulation of work that disturbs friable asbestos-containing insulation;
- where significant quantities of friable asbestos-containing insulation have fallen down and are being disturbed.

The procedures outlined in sections 12, 13 and 14 of the regulation should protect building occupants in the first two situations mentioned above. Section 5 deals with the third situation.

Duties of a Building Owner

The regulation specifies two situations where a building owner must have friable material tested to determine if it contains asbestos. Where a building is going to be demolished, repaired or otherwise altered, section 7 requires the owner to inspect the building for friable material that may be disturbed by the work, to test the material to determine if it contains asbestos and to prepare a report on the results of the inspection and testing. These requirements are discussed more fully elsewhere in this Guide (Chapter 6 - Inspection and Notification). Even where no work is being done to a building, if there is friable insulation that is deteriorating and falling down in significant quantities into an area where it can be disturbed, the owner must have the material tested, under subsection 5(3). Apart from these particular requirements, the regulation places no

obligation on an owner to establish whether or not friable asbestos-containing material is present in a building.

Once an owner knows of the presence of the material in a building, subsection 5(1), the requirement for an asbestos management program is activated. Part of this program is the periodic inspection of the asbestos-containing insulation in the building. If the insulation is found to be deteriorating and falling down, then, under subsection 5(4), the owner is required to clean up the fallen material and take appropriate measures to prevent more insulation from falling. This requirement, although not included in subsection 5(1), is an important part of the management program.

Management Program for Asbestos in Buildings

As discussed above, once an owner knows of the presence of friable asbestos-containing material, an asbestos management program for the building must be instituted. The requirements of the asbestos management program are listed in subsections 5(1) and 5(4). They include:

- preparation and maintenance of a record of the location of friable asbestos-containing material;
- notification of the presence of the material to workers who may work in close proximity to it and who might disturb it;
- training of workers who may work in close proximity to, and disturb, the material;
- periodic inspection of the material;
- remedial action on material that has deteriorated.

The asbestos management program is mainly the responsibility of the building owner. However, "owner" is defined by the Act as including tenants and lessees. This could cause confusion because it means that where there are tenants, a building could have more than one owner, raising the question of who would be responsible for the asbestos management program. The regulation makes allowance for

this situation. Under clause 5(1)(b) an owner who is not a tenant or lessee is required to inform any tenants or lessees who are at or adjacent to the location of the friable asbestos-containing material. Then, under subsection 5(2), the tenant or lessee becomes responsible for the notification and training requirements of the asbestos management program, with respect to the area occupied by the tenant or lessee.

The purpose of the management program is to protect workers and building occupants from elevated fibre exposures by:

- cleaning up material that has been released;
- preventing further release by minimizing disturbance of asbestos-containing friable material;
- monitoring the condition of the friable material and maintaining it in a good state of repair.

For the program to be effective, those involved in it must be properly trained and the appropriate procedures carefully followed.

Asbestos Record: The asbestos management program begins with the recording of the location of any friable asbestos-containing material. This record should be maintained in the building and be available for inspection by any worker in the building whose work may involve the disturbance of the material.

Notification of Workers: All workers who may disturb the friable material should be informed that it contains asbestos. This will permit them to adopt appropriate procedures to protect both themselves and other occupants of the building from the asbestos. While it would be desirable for all such workers to be informed about asbestos, it is unreasonable to expect the owner to know about every worker in the building. Therefore, the regulation just requires the notification of those workers of whose presence the owner is aware. Nevertheless, it is desirable to reach as many workers as possible. To do this, the owner could set up a procedure to inform

all tradesmen who work in the building and get tenants to participate in the scheme.

Worker Training: There are two requirements in the regulation for worker instruction and training. Section 15 requires an employer to provide training to workers working on a Type 1, Type 2 or Type 3 operation. This training is to include instruction in the hazards of asbestos exposure, personal hygiene and work practices, and the use of respirators and protective clothing. The training requirement of the asbestos management program is similar. However, because of the preventive nature of the program, the training is to be provided not just to workers actually working with asbestos but also to workers who are likely to.

Periodic Inspections: Locations in the building where there is friable asbestos-containing material should be regularly examined to assess the condition of the material and the need for corrective action. Sprayed on insulation is usually the most significant source of airborne asbestos fibres. Indicators of poor condition include debris on horizontal surfaces, hanging material, dislodged chunks, scrapings, indentations and cracks. Since water can dislodge, delaminate or otherwise disturb the insulation, insulated areas should be inspected for visible signs of water damage. On pipe and boiler insulation, protective jackets prevent fibre release. Inspections should therefore concentrate on checking the protective jacket for damage and the condition of the unjacketed joints and elbows.

Corrective Action: Where the periodic inspection reveals deterioration, and it is apparent that the friable material will continue to fall down, subsection 5(4) requires corrective action to be taken. In the case of sprayed-on material, the available options are encapsulation, enclosure or removal. For damaged pipe and boiler insulation, the available options also include repair of the insulation with a non-asbestos material. These options are discussed in greater detail below.

Control Options for Deteriorating Insulation

The presence of deteriorating asbestos-containing insulation should be readily detected in a building with a regular inspection program. But this program is only required in a building that is known to contain friable asbestos-containing material. Subsection 5(3) of the regulation deals with the situation where there is deteriorating friable insulation in a building not known to contain asbestos. If this is the case, the owner must have the material tested to determine if it contains asbestos (see Appendix 6 for description of how insulation should be sampled). If the deteriorating insulation does contain asbestos, then corrective action must be taken. Four options are available: the insulation can be repaired, encapsulated, permanently enclosed or removed.

Repair: When damage to pipe or boiler insulation is limited, repair is the easiest control option. Non-asbestos plastering can restore open joints, wrapped or plastered areas that are damaged and areas around valves and flanges.

Encapsulation: The term "encapsulation" refers to the application of a sealant to asbestos containing material. It is a useful control method for pipe insulation, which can be wrapped and painted or re-jacketed, and for sprayed insulation if it is in good condition and can be thoroughly penetrated by the encapsulant. There are certain situations for which encapsulation should not be used. Material that has poor cohesive strength, water damage or is not firmly attached to the underlying surface may be pulled down by the weight of the encapsulant. Highly friable or deteriorated insulation may be blown off by the sealant application. Material in locations that are accessible to building occupants can be damaged and can release fibres even after encapsulation.

TABLE 2

Advantages and Disadvantages of Encapsulation

Advantages

- controls exposure without requiring removal (and replacement) of insulation
- quickest and simplest method of control
- least expensive control method in the short run (see disadvantages)

Disadvantages

- asbestos source remains
- management program and inspections still required
- material must eventually be removed (see section 4 of regulation), and encapsulated surface makes removal difficult
- cannot be used if material is in poor condition (see Chapter 9 of Guide)

In addition to the situations in which encapsulation is not advisable, there are advantages and disadvantages to the use of encapsulants that should be considered before deciding on an appropriate control option. These are listed in Table 3. Encapsulation is most useful in small areas where removal is impractical or re-insulation is not feasible.

Enclosure: Enclosure involves the construction of airtight walls and ceilings around the asbestos-containing material. It can be a highly effective method of protecting building occupants from asbestos fibre release if the enclosure is properly constructed. The construction material should be impact-resistant and assembled to be airtight. **Suspended ceilings with lay-in panels are not acceptable.** The advantages and disadvantages of the enclosure option are similar to those of encapsulation. In addition, because

fibre release can continue within the enclosure, special procedures have to be established to control access to the enclosure for maintenance and renovation.

Removal: The removal option has the major advantage of permanently eliminating the asbestos-containing material and, with it, any potential problem. It is the one control option that removes the need for an asbestos management program. These are the advantages of removal. Its disadvantages are the need to replace the removed insulation and the cost and complexity of doing the job correctly. If the work is performed improperly, there is a high risk of contaminating the rest of the building.

9. Respirators

The regulation applies to work with asbestos that is either intermittent, such as repair and maintenance activities, or where the working conditions are constantly changing, as in construction, renovation and demolition work. For this type of work, it is not feasible to use permanent engineering controls to minimize asbestos exposure. Instead, reliance is placed on temporary measures, such as enclosure of, and restricted entry to, the work area and the use of personal protective equipment, mainly respirators. Because of the almost total reliance the regulation places on respirators for worker protection, it is essential that both workers and employers understand how to use them properly.

General requirements for the use of respirators are listed in section 10. In addition, section 15 requires the employer to ensure that training in the use of respirators is provided. This training is to cover:

- limitations of the equipment;
- how to obtain a proper fit;
- care and maintenance.

The training is to be supplemented by written procedures regarding the selection, use and care of respirators, which are to be provided to each worker required to wear a respirator.

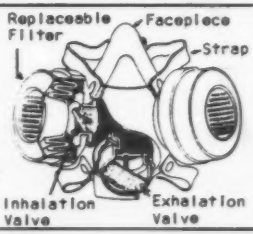
Types of Respirator

Respirators fall into one of two general categories: supplied air and air purifying. Supplied air respirators, as the name implies, provide

1) Disposable Masks
Most of these devices are designed to be worn only once. Some have adjustable straps and exhalation valves and can be worn more than once if not damaged.

2) Quarter-Face Masks
These are usually designed to be reused and fit over the mouth and nose. They rest on the chin and are held in place by one or two straps.

3) Half-Face Masks
This style is widely used with air-purifying respirators and with some supplied air systems. It generally provides better protection than quarter-face masks.



4) Full-Face Masks
Full-Face masks can be used with air-purifying, powered air-purifying and supplied air respirators. They cover the entire face and provide more protection than other face masks.

5) Hoods and Helmets
These devices do not rely on tight seals to prevent inward leakage of contaminated air. Instead they depend on the continuous flow of large volumes of air. They can be used with powered air-purifying and supplied-air systems.

FIGURE 12 RESPIRATOR FACEPIECE STYLES

clean air from an independent source either carried by the user (self-contained breathing apparatus or SCBA) or delivered to the user through an air supply line or hose. Air purifying respirators use filters to remove particulate, vapour and gas contaminants from the workplace air. If an air purifying respirator is used, it must be suitable for protection against asbestos. A HEPA filter is preferred. The regulation requires both supplied air and air purifying respirators, depending on the work being performed (see Table 3). Respirators certified by the U.S. National Institute for Occupational Safety and Health (NIOSH) or The British Standards Institution meet these requirements.

Supplied Air Respirators

Supplied air respirators can receive air from a compressed air source or an air pump or blower. They can be equipped with a variety of facepieces: half or full-face masks, helmets or hoods. They may supply air only on "demand" of the wearer or as a continuous flow. Leakage is a problem with demand devices because inhalation creates a negative pressure that allows contaminated air to enter the facepiece. Continuous flow devices create a positive pressure within the mask that is independent of the wearer's breathing. The regulation requires supplied air respirators to be of the positive pressure type and equipped with a full facepiece.

Air Purifying Respirators

These respirators may be equipped with quarter, half or full-face masks, helmets or hoods. They can be powered or non-powered. Non-powered types are operated by the breathing action of the wearer. This can result in negative pressure within the facepiece and the inward leakage of contaminated air. There may also be noticeable resistance to inhalation, which may be bothersome to some individuals. These problems can be overcome by using a powered respirator. Powered air purifying respirators (Fig. 13) contain a blower that passes the contaminated air through the filter

TABLE 3

Respirator Requirements

Work Category	Respirator Required
Type 1 operation	Non-powered reusable or replaceable air purifying * dust respirator, if requested by a worker
Type 2 operation	Non-powered reusable or replaceable air purifying * dust respirator
Type 3 operations	
• work with power tool not equipped with dust collector and HEPA filter	Powered air purifying * positive pressure dust respirator
• work with wet friable material that contains only chrysotile asbestos	Non-powered reusable or replaceable air purifying * dust respirator
• work with wet friable material that contains asbestos of a type other than chrysotile	Powered air purifying * positive pressure dust respirator
• work with friable material that cannot be wetted	Supplied air, positive pressure full facepiece respirator

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* Air purifying respirators must be equipped with a filter that is suitable for protection against asbestos.

and supplies air at positive pressure within the facepiece, hood or helmet. In this respect they are similar to a supplied air positive pressure respirator; however, subsection 10(4) of the regulation states that they are not to be considered a supplied air respirator. To minimize the inward leakage of contaminated air, a minimum air flow must be maintained; six cubic feet per minute (170 L/min) for loose-fitting hoods or helmets and four cubic feet per minute (130 L/min) for tight-fitting facepieces.

Respirator Fit

The regulation requires non-powered air purifying respirators to be fitted so that there is an effective seal to the worker's face

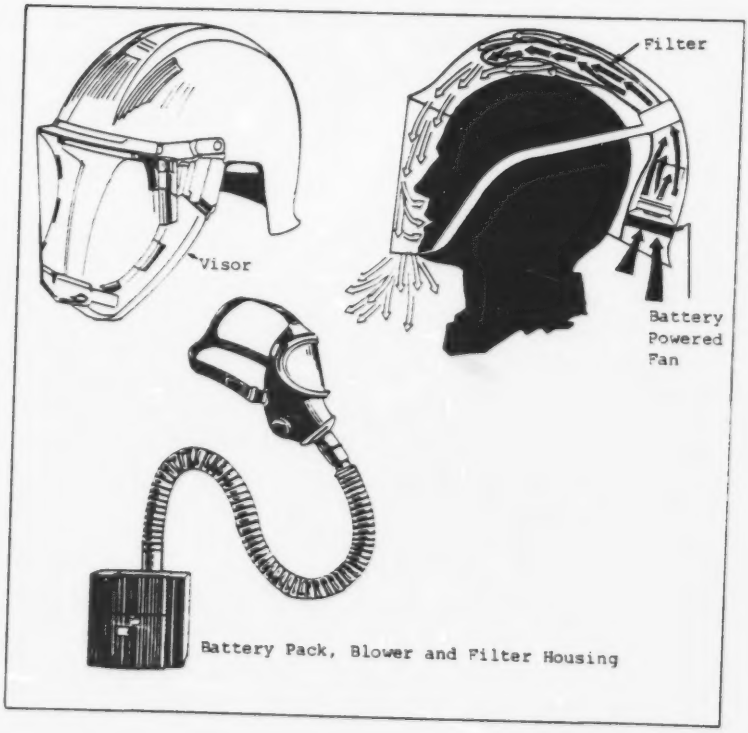


FIGURE 13 POWERED AIR PURIFYING RESPIRATORS

(clause 10(1)(a)). This is very important since the degree of protection provided by this class of respirator is very dependent upon the fit of the device to the wearer's face.

This requirement means that these devices are not to be worn unless they have been tested by the wearer to ensure that there are no leaks around the facepiece.

There are two methods of testing the fit of respirators. One is "qualitative", where simple tests are used to check for signs of leakage; the other is "quantitative", where tests actually measure the leakage using special instrumentation.

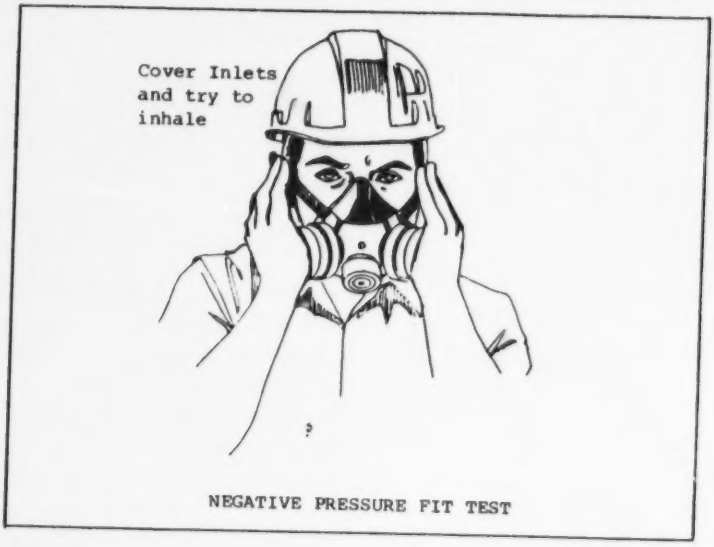
There are three ways to fit-test the air purifying respirators required by this regulation:

- positive and negative pressure tests;
- irritant smoke test;
- saccharin test.

Positive and Negative Pressure Tests

These tests are simple and quick, and can be performed by the wearer to check the respirator fit at any time during a work shift. The positive pressure test is conducted by covering the exhalation valve, usually located on the bottom of the respirator, with the palm of the hand and exhaling gently. The facepiece should puff slightly away from the face without allowing air to escape. The negative pressure test involves covering the air inlets and then inhaling. A slight collapse of the facepiece with no air leakage indicates a satisfactory fit.

While both of these tests can be used with most replaceable filter-type respirators, they cannot be used to fit-test "disposable dust masks", shown in Figure 12. For these to be permitted under this regulation, either the irritant smoke test or the saccharin test must be used to establish that the respirator is properly fitted. Cartridge-type respirators are therefore preferred.



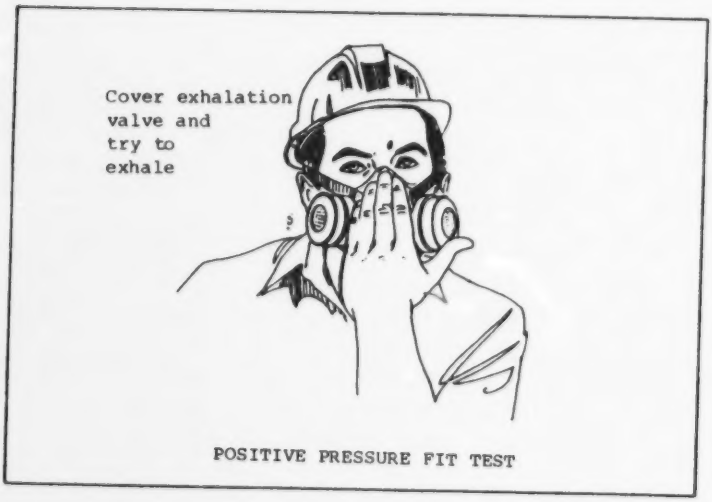


FIGURE 14 POSITIVE AND NEGATIVE PRESSURE FIT TESTING

Irritant Smoke Test

To perform this test, the respirator must be equipped with a HEPA filter. An irritating "smoke" is generated by passing air through a glass tube that contains an irritant (Test kits are available commercially). The smoke is then directed around the sealing surface of the respirator. The wearer usually reacts to any leakage by coughing involuntarily.

Saccharin Test

In this test the respirator is challenged by a saccharin aerosol in place of the irritant smoke. If a leak is present, the wearer will detect a sweet taste.

Respirator Maintenance

Respirators have to be maintained in good operating condition if they are to be effective. The maintenance program should follow the manufacturer's instructions and include provisions for the following:

- cleaning and disinfecting the equipment;
- inspection, testing and repair;
- storage.

Cleaning and Disinfection

The regulation requires respirators to be cleaned and disinfected at least after each shift or after each use when used by more than one worker. A procedure is outlined in Appendix 5.

Inspection, Testing and Repair

After being cleaned and disinfected, each respirator should be inspected and tested to determine if it is in proper working

condition. An inspection checklist can be found in Appendix 4. Where the inspection indicates repairs are required, they are to be carried out before the respirator is used again. Replacement parts must be those of the manufacturer of the equipment.

Storage

The regulation requires respirators that are not in use to be stored in a convenient, clean and sanitary location. The storage area should protect the equipment from dust, sunlight, heat, extreme cold, excessive moisture and damaging chemicals. Individual respirators should be placed in plastic bags and stored in a manner that will prevent distortion of rubber or plastic parts.

Training

Section 15 of the regulation outlines the duties of an employer with regard to worker instruction and training. Part of this training is to deal with the use of respirators. Section 5 places a similar responsibility on an owner. The instruction, in the case of an employer, is to be provided to every worker in a Type 1, 2 or 3 operation, and in the case of an owner, to every worker employed by the owner who is likely to work near friable asbestos-containing material that may be disturbed by the work. The regulation does not require the employer to do the actual instructing but only to ensure that it is provided by a competent person. This means that the instructor must be both familiar with the Occupational Health and Safety Act and the asbestos regulations and knowledgeable about respirators and the hazards of asbestos. In addition, the instructor should have good teaching skills.

The instruction must cover the following:

- the respirator requirements of the regulation;
- the selection of a respirator;
- how to obtain and check for a proper fit;

- limitations of the equipment;
- procedures for the proper use, maintenance and storage of respirators.

In addition to training, the regulation requires the employer to establish written procedures for the selection, use and care of respirators (subsection 10(2)). A copy of these procedures is to be given to, and reviewed with, every worker who is required to wear a respirator.

Physical Ability to Use a Respirator

The use of a respirator places extra physical demands on the wearer. Air purifying respirators make breathing more difficult; any respirator is an added weight to carry (more than 25 pounds in the case of SCBA); an air-line respirator requires, in addition, a length of hose to be dragged around.

The regulation requires that a worker not be assigned to an operation requiring the use of a respirator unless physically able to perform the work while using the respirator. Where there is doubt about a worker's ability to work with a respirator, the worker should seek the advice of a physician. The physician's examination should concentrate on conditions that affect the worker's ability to breathe. Heart problems can also make the wearing of a respirator ill-advised. In the case of a worker required to wear SCBA, the weight of the respirator should be considered in judging the ability of a worker to perform the work.

10. Instruction and Training

The control of asbestos exposure is to be achieved by following the procedures prescribed by the regulation. But these procedures can only be as effective as the person carrying them out. It is therefore essential that everyone involved in doing the work, both workers and supervisors, be properly trained. Instruction and training requirements are outlined in sections 5 and 15 of the regulation. Under subsection 5(1), an owner is required to institute and maintain a training program for those workers of the owner who are likely to disturb friable asbestos-containing material in the course of their work. Section 15 requires all employers (including owners) to ensure that instruction and training is provided to every worker working in a Type 1, Type 2 or Type 3 operation.

In each case the training is to cover the following areas:

- the hazards of asbestos;
- personal hygiene and work practices;
- the use, cleaning and disposal of respirators and protective clothing.

This does not mean that training should be the same for all workers; rather it should depend on the work being done. If a worker is only involved in Type 1 operations, brake repair for example, there is no need to be familiar with the procedures for a Type 3 removal operation. On the other hand, workers who are involved in Type 3 removals may need quite extensive training.

Instruction and training must be provided by a competent person. This could be the employer or someone hired by the employer. A competent person is defined under the Act as a person who:

- is qualified because of his knowledge, training and experience to organize the work and its performance;
- is familiar with the provisions of this Act and the regulations that apply to the work; and
- has knowledge of any potential or actual danger to health or safety in the workplace.

The regulation also requires that a health and safety representative, where there is one, or the representative of a joint health and safety committee is to be advised when and where the training and instruction is to be carried out.

11. Medical Surveillance

Asbestos-related diseases develop slowly over time and are usually not noticed by affected workers until they are at an advanced stage. To permit earlier detection of such diseases, the regulation prescribes a medical surveillance program for all workers who are exposed to asbestos on Type 2 or Type 3 operations. Under this program, employers are required to report the number of hours each employee works on each Type 2 or Type 3 operation to the chief physician of the ministry's Occupational Health Medical Service. The chief physician keeps track of each worker's accumulated exposure and decides when a medical examination is required. The medical examinations are performed in a Ministry of Labour chest clinic.

Asbestos Work Report

An Asbestos Work Report form has been designed to assist employers in the reporting of each worker's asbestos exposure (Fig. 15). Copies of the form are available from all Ministry of Labour District Offices (Appendix 9). The form requires the following information:

- the worker's name, address, date of birth and social insurance number;
- the employer's name and address;
- the name and address of the worker's physician;
- the number of hours of exposure in each Type 2 or Type 3 exposure category.

FIGURE 15 ASBESTOS WORK REPORT FORM

Ontario Ministry of Labour / Ministère du Travail de l'Ontario

Form 1/Formule nº 1
Occupational Health and Safety Act/Loi sur la santé et la sécurité au travail

For the Period/Pour la période
From/du To/au

Asbestos Work Report/Rapport sur le travail avec l'amiante

Name of Employer/Nom de l'employeur

Employer's Address/Adresse de l'employeur

Employee's Surname/Nom de l'employé | Given Name/Prénom | Init./Init.

Address/Adresse (Street Nº Street City Postal Code/No de rue, Rue, Ville, Code postal)

SI N./Nº d'ass. sociale

Date of Birth/Date de naiss.
Y/A Mo/M D/J

Family Physician's Name and Address/Nom et adresse du médecin de famille

Hours of Exposure/Temps d'exposition

Category of Exposure (see reverse for description of category)/Categorie d'exposition (voir description des catégories au verso)

A	B	C	D	E	F	G	H	I	Other/Autre(s)	Explain/Préciser

Signature/Signature

Return to: Chief Physician
Occupational Health Medical Service
400 University Avenue
Toronto, Ontario
M7A 1T7

Renvoyer au: Médecin chef
Service médical de la santé au travail
400, avenue University
Toronto (Ontario)
M7A 1T7

Distribution/Distribution
Part 1 — Chief Physician / Partie 1 — médecin chef
Part 2 — Worker / Partie 2 — travailleur
Part 3 — Employer / Partie 3 — employeur

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A completed Asbestos Work Report form is to be submitted at least annually for each worker and when the employment of a worker is terminated. A copy of the form must also be given to the worker.

Asbestos Workers Register

The chief physician uses the Asbestos Work Report forms that are submitted to establish an Asbestos Workers Register. The register allows the chief physician to identify workers who, because of their potential accumulated exposure to asbestos, should receive a medical examination. When a worker has accumulated 2,000 hours of exposure, the equivalent of one full year's employment, the worker is notified to report to a ministry chest clinic for a medical examination.

Medical Examinations

As outlined in subsection 17(2) of the regulation, the medical examination is to consist of the following:

- a medical questionnaire;
- chest X-rays;
- pulmonary function tests.

Pulmonary, or lung, function tests are an important screening measure in the examination of asbestos workers. They measure, among other things, the lung capacity, or volume of air that can be held in the lungs. A reduced capacity is one of the earliest signs of asbestosis, which results in an inability to expand the lungs as fully as they should. Because this could be due to other causes, X-rays are also performed. Chest X-rays can show the fibrotic scarring at the lung bases that is characteristic of asbestosis. The early diagnosis of lung cancer is also possible with chest X-rays.

The regulation states that workers are to undergo medical examinations at the expense of the employer. This does not mean

that the employer must pay for the examinations, which are to take place at Ministry of Labour chest clinics. The employer is only responsible for costs incurred by a worker in having the examination, the main ones being travelling costs and payment for time lost from work.

Subsection 17(4) deals with the distribution of the results of the medical examination. A report of the results of medical examinations and clinical tests are given by the chief physician to the worker's personal physician, and the worker is advised of the mailing. Included in the chief physician's report is an interpretation of the results. If the worker has no physician, the chief physician's report is sent directly to the worker. If the worker has died, the records may be released to the next of kin or the worker's personal representative, upon written request. Any other authorization by the worker for the release of the records is invalid.

The finding of an asbestos-related medical condition raises the question of what action should be taken. More specifically, should a worker with an asbestos-related disease continue to work where there is asbestos exposure? In the case of mesothelioma or lung cancer, the answer is clear. Apart from obtaining medical treatment, there is no reason not to continue working. Additional exposure will not affect the outcome of the disease. With asbestosis, the answer is less clear. Asbestosis that is currently being diagnosed results from work in the past when workers were commonly exposed to much higher concentrations of asbestos. In comparison, current exposures are so much lower that it is uncertain that removal from such exposure would affect the condition of a worker with asbestosis. Asbestosis is a progressive disease and it will continue to develop even when exposure has stopped.

The decision of whether or not to continue exposure is up to the affected worker. Should such a worker decide to work no longer with asbestos, and, as a result, suffer a loss earnings, then, as stated

in subsection 17(6) of the regulation, the worker is entitled to compensation as may be allowed under the Workers' Compensation Act.

12. Equivalent Measures and Procedures

The regulation is able to cover a wide variety of asbestos work because it prescribes a limited number of procedures for doing the work. This means that there may be other ways of carrying out the work that are equally protective of workers. In addition, it is possible that, in some cases, the prescribed procedures are unnecessarily stringent. Section 18 of the regulation therefore permits the substitution of alternative procedures, provided that they are shown to be adequately protective of workers. Before using a substitute procedure, an employer must apply in writing to the director of the Construction Health and Safety Branch and obtain the director's written approval. The application to the director should provide the following information:

1. A detailed description of the work to be undertaken, including:

    - the geographical location of the work site;
    - the classification of the work (as per section 9 of the regulation);
    - the expected duration of the work;
    - whether the work will be conducted indoors or outdoors;
    - the type(s) of asbestos that will be handled;
    - the percentage of asbestos content in any asbestos-containing material that will be disturbed by the work; and
    - the number of workers that may be exposed to asbestos.

2. The type and make of protective equipment, including respirators, that will be worn or used by workers doing the work.

3. A list of the measures and procedures in the regulation that the employer wishes to vary.

4. A description of the measures that will be taken to protect the health of workers and any available evidence or documentation to support the claim that the measures provide adequate worker protection.

Glove Bags

An example of an acceptable alternative procedure is the use of glove (or containment) bags for the removal of asbestos-containing pipe insulation. A glove bag procedure is outlined in Appendix 8. Glove bags can be used to carry out asbestos removals from pipes as an alternative to the use of an enclosure in such work if prior written approval is obtained from the director.

13. Appendices

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APPENDIX 1 - Glossary

The Act - Occupational Health and Safety Act, Revised Statutes of Ontario, 1980 Chapter 321.

Actinolite - A type of mineral that can occur in a fibrous form.

Aggressive sampling - The process of artificially stirring up air in a building while air samples are being collected in order to simulate the airborne asbestos levels that will be experienced by building occupants during normal activities.

Air monitoring - The process of collecting samples of air and analysing them to determine the amount of a contaminant that is present.

Air samples - For monitoring asbestos, air is drawn through a filter that traps asbestos fibres.

Amended water - Water to which a surfactant has been added.

Amosite - A type of asbestos mineral; the removal of insulation that contains amosite may result in dustier conditions.

Anthophyllite - A type of mineral that can occur in an asbestiform habit.

Asbestiform - A term used to describe minerals that crystallize in fibres.

Asbestos - Any of the following asbestiform silicate minerals : actinolite asbestos, anthophyllite asbestos, chrysotile, crocidolite, cummingtonite-grunerite asbestos (amosite), tremolite asbestos.

Asbestos bodies - Inhaled asbestos fibres that become coated with a substance containing protein and iron; also called "ferruginous bodies".

Asbestos warts - Harmless skin growths that occur when asbestos fibres penetrate the skin.

Asbestosis - A chronic, restrictive lung disease due to the inhalation of asbestos fibres.

Building - Defined by the regulation as a structure and its electrical, plumbing, heating and air handling equipment.

Chrysotile - A type of asbestos mineral; the type most commonly used in building construction.

Construction - Defined by the Act as including "erection, alteration, repair, dismantling, demolition, structural maintenance, painting, land clearing, earth moving, grading, excavating, trenching, digging, boring, drilling, blasting, or concreting, the installation of any machinery or plant, and any work or undertaking in connection with a project."

Constructor - Defined by the Act as "a person who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself or by more than one employer."

Crocidolite - A type of asbestos mineral.

Employer - Defined by the Act as a person who employs one or more workers or contracts for the services of one or more workers and includes a contractor or subcontractor.

Encapsulation - The application of a sealant to asbestos-containing material; the sealant may penetrate and harden the material (penetrants) or cover the surface with a protective coating (bridging sealants).

Enclosure - The construction of airtight walls and ceilings around asbestos-containing material.

Fibrous Aerosol Monitor (FAM) - An instrument that uses lasers and electronics to make approximate measurements of airborne fibre levels; it cannot distinguish asbestos fibres from other fibrous material in the air.

Friable - Capable of being crumbled, pulverized or reduced to powder by hand pressure.

Friable material - Defined by the regulation as a "material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered."

HEPA filter - A high efficiency particulate aerosol filter that is at least 99.97 per cent efficient in collecting a 0.3 micrometre aerosol.

Mesothelioma - A rare cancer arising from the surface-lining cells of the pleura and peritoneum.

Negative air - A term used to refer to the system of air filtration used for controlling airborne asbestos at asbestos removal projects through the maintenance of lower air pressure on the inside of an enclosure than exists on the outside.

Owner - Defined by the Act as including a "trustee, receiver, mortgagee in possession, tenant, lessee, or occupier of any lands or premises used or to be used as a work place, and a person who acts for or on behalf of an owner as his agent or delegate."

Peritoneum - Lining of abdominal cavity and organs.

Phase - Contrast Microscopy (PCM) - The least expensive and most widely used method of analysing air samples for asbestos.

Pleura - Membrane lining the chest cavity and lungs.

Pleural plaques - Areas of fibrous tissue that may calcify or harden; they are not generally associated with disease.

Project - A construction project, including, but not limited to, the contruction of a building, bridge, structure, industrial establishment, mining plant, shaft, tunnel, caisson, trench, excavation, conduit, sewer, watermain, service connection, electrical cable, pipeline or duct (see the Act for full definition).

Surfactant (Surface-active agent) - A substance that reduces the surface tension of water, allowing it to spread over the surface of a material and to penetrate it more easily, e.g. a detergent.

Tremolite - A mineral that can occur in an asbestiform habit.

Worker - Defined by the Act as "a person who performs work or supplies services for monetary compensation."

APPENDIX 2 - Uses of Asbestos

Over 3,000 separate uses of asbestos have been identified. The major use categories are discussed below.

Asbestos-cement (A/C) Products

The largest use of asbestos, in terms of the tonnage of fibres employed, is as a reinforcing agent in cement products. Asbestos-reinforced cement is strong, durable, rigid and resistant to both fire and weather. Portland cement, water and asbestos are mixed to form a slurry from which end-products can be fabricated by a process similar to that used in paper making. Products include sheets, pipes and a wide variety of other shapes. The asbestos fibre content of A/C products is usually about 15 per cent.

Asbestos-cement sheet is produced in four basic forms: flat sheet, corrugated sheet, siding shingles and roofing shingles. The main use of A/C sheet is for the roofing and cladding of buildings. Other uses are decorative panelling, electrical insulation and laboratory table tops. Asbestos-cement pipe is used for water supply, sewage, irrigation, drainage applications, the transport of corrosive chemical fluids, and electric and telephone conduits.

Asbestos Textiles

Asbestos textile materials are predominantly manufactured from chrysotile fibres. Two types of yarn are produced: plain, possibly braced with an organic fibre, and reinforced, which incorporates either wire or another yarn such as nylon, cotton or polyester. Major uses for asbestos textiles are gaskets, packings, friction materials, thermal and electrical insulation, and fire resistant applications, e.g. welding curtains, protective clothing, theatre curtains, hot conveyor belts and ironing board covers.

Paper Products

Asbestos paper products are used in a wide variety of applications. Among the most important are roofing felt, gaskets, pipeline wrap, millboard, electrical insulation, electrolytic diaphragms, and beverage and pharmaceutical filters. Some of these applications are discussed below under the headings "Insulation" and "Gaskets and Packings".

Insulation

Asbestos in a variety of forms has been used as thermal, acoustic and electrical insulation. The insulation material may be in the form of a spray, board, paper, textile or cement composite.

Asbestos-based thermal insulating boards, which contain about 25-40 per cent asbestos fibre embedded in portland cement, have been used for internal wall and ceiling linings, duct and door linings, and in the fire protection of structural steelwork. The uses of asbestos millboard include linings for low-pressure steam pipework and thermal insulation of sheet metal ductwork and industrial ovens. Sprayed asbestos is a gun-applied hydrated asbestos-cement containing about 60 per cent asbestos fibre. It has been used particularly as a means of protecting structural steelwork against fire and heat. Many asbestos-based thermal insulating products have also been used as acoustic insulation. In addition, some older acoustical tiles contain significant amounts of asbestos; they may either be stapled or glued in place or suspended on a T-Bar.

As electrical insulation, asbestos may be used in the form of paper, tape, cloth or board, and also as felted material or as filler for natural and synthetic resins. Asbestos-cement products are used by the electrical industry in the construction of panel boards, arcing barriers, and insulating tubes and cylinders in air-cooled transformers. Asbestos materials are not suitable for high-voltage

insulation. Their main electrical use is in low-voltage, high temperature situations and for confinement of arcs.

Plastics

Asbestos has been used as a reinforcing agent in a wide range of asbestos/polymer composites. The asbestos enhances the heat resistance, stiffness, dimensional stability and impact strength of the plastic product, improves the processability of the resin and reduces costs through resin extension. Applications include brake and transmission components, floor tiles, engine housings, bins and containers, and a variety of coatings, adhesives, caulks, sealants and patching compounds. Two areas have dominated asbestos use in plastics: phenolic moulding compounds and vinyl-asbestos floor tile.

Friction Materials

Asbestos has been used in the manufacture of brake and clutch linings and pads. The asbestos fibres may be embedded in a phenolic resin with various mixtures of fillers or a woven asbestos cloth may be impregnated with the resin. The asbestos imparts stiffness and strength to the material, properties that are retained at elevated temperatures.

Gaskets and Packings

The combination of long asbestos fibres and high temperature rubbers has provided some of the best gasket materials. The asbestos, in bulk fibre, woven, or plaited form, provides strength and temperature resistance, while the rubber acts as the binder and sealing material. Asbestos yarns have been commonly used in the manufacture of braided and woven packing materials.

Coatings and Sealants

Asbestos has been used in roof coatings and cements and, to a lesser extent, in sealants and caulks. Roof coatings consist of asphalt liquified with solvents and an asbestos fibre filler. Roof cements are similar, but they are formulated to a thicker consistency so that they can be used to seal openings through which a liquid coating would flow.

APPENDIX 3 - Checklists for Asbestos Work Procedures

Once asbestos work is classified, various requirements of the regulation will apply to those involved in carrying out the work. The requirements for all types of work can be found in section 8 and sections 10 through 16 of the regulation. Which of these requirements applies on a particular job will depend on the job classification. The checklists that follow have been prepared to make it easier to determine if the requirements appropriate to the type of work operation are being followed. There are five lists, one for each of the following major work categories:

- Type 1 Operations
- Type 2 Operations
- Type 3 Operations - Work on a Manufactured Asbestos-containing Product with a Power Tool Not Equipped with a Dust Collection Device and HEPA Filter
- Type 3 Asbestos Removal Outdoors
- Other Type 3 Operations

Each item in the list has a reference to the corresponding requirement in the regulation.

Type 1 Operations

1. Visible dust removed from work area (s. 11 para 1).

2. Dust removed by damp wiping or vacuuming with HEPA filter-equipped vacuum (s. 11 para 1).

3. No eating, drinking, chewing or smoking in work area (s. 11 para 6).

4. Drop sheets (or other measure) to control spread of dust (s. 11 para 2).

5. Asbestos-containing products wetted, where practicable (s. 11 para 3).

Note: Items 6 to 11 only apply where a worker requests a respirator.

6. Non-powered reusable or replaceable air purifying dust respirator suitable for asbestos provided by employer (s. 11 para 7).

7. Respirators cleaned, disinfected and inspected after use on each shift (clause 10(1)(e)).

APPENDIX 3 - Checklists for Asbestos Work Procedures (Cont'd)

Type 1 Operations (cont'd)

8. Respirators in good state of repair (clause 10(1)(f)).

9. Respirators fitted with an effective seal, where applicable (clause 10(1)(a)).

10. Written procedures for respirator use, care and selection (subsection 10(2)).

11. Clean, convenient and sanitary location for respirator storage (clause 10(1)(g)).

12. Instruction provided on the use and care of respirators (subsection 15(3)).

13. Compressed air not used to clean up or remove dust from any surface (s. 11 para 5).

14. Asbestos dust and waste cleaned up at regular intervals (s. 11 para 4).

15. Waste in dust-tight containers (s. 11 para 4).

16. Waste containers identified as containing asbestos (s. 11 para 4).

17. Drop sheets that will be reused to be cleaned by damp wiping or vacuuming with HEPA filter-equipped vacuum (s. 11 para 4).

18. Drop sheets that will not be reused to be wetted and disposed of as asbestos waste (s. 11 para 4).

19. Washing facilities for hands and face provided (s. 11 para 8).

20. Washing facilities used by workers (s. 11 para 8).

21. Instruction and training provided (s. 15).

Type 2 Operations

Preparation of the Work Area

1. Friable asbestos-containing material removed from surfaces in work area (s. 13 para 3).

2. Friable material removed by damp wiping or vacuuming with HEPA filter-equipped vacuum (s. 13 para 3).

3. Drop sheets (or other measure) to control spread of dust (s. 13 para 5).

   Note: Items 4 to 8 apply only to the preparation of the work area for a Type 2 operation mentioned in subclauses 9(1)(b)(i) or (ii) of the regulation, i.e. the removal of a false ceiling or the minor removal or disturbance of friable asbestos-containing material.

4. Signs warning of asbestos dust hazard (s. 13 para 1).

5. Mechanical ventilation system serving work area disabled (s. 13 para 6) .

6. Ventilation ducts to and from work area sealed (s. 13 para 6)*.

7. Work area enclosed by walls or other enclosure (s. 13 para 6).

8. Friable material removed from surface of false ceiling when access obtained (s. 13 para 2).

Work Practices

9. No eating, drinking, chewing or smoking in work area (s. 12 para 2).

10. Compressed air not used to clean up or remove dust from any surface (s. 12 para 6).

11. Wetting agent added to water for dust control (s. 12 para 1).

12. All friable material that may be disturbed, wetted, unless wetting would create hazard or cause damage (s. 13 para 4).

13. Asbestos dust and waste cleaned up at regular intervals (s. 13 para 7).

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* Where practicable.

Type 2 Operations (cont'd)

14. Waste in dust-tight containers (s. 13 para 7).

15. Waste containers identified as containing asbestos (s. 12 para 3).

16. Drop sheets and barriers that will be reused to be cleaned by damp wiping or vacuuming with HEPA filter-equipped vacuum (s. 13 para 7).

17. Drop sheets and barriers that will not be reused to be wetted and disposed of as asbestos waste (s. 13 para 7).

18. Protective clothing and equipment worn by all persons in work area (s. 12 para 7).

Protective Clothing and Equipment

19. Protective clothing provided by employer (s. 12 para 5).

20. Protective clothing made of material that does not readily retain or permit penetration of asbestos fibres (s. 12 para 5).

21. Footwear and head covering included as protective clothing (s. 12 para 5).

22. Protective clothing repaired or replaced if torn (s. 12 para 5).

23. Protective clothing decontaminated by damp wiping or with vacuum equipped with a HEPA filter before leaving work area (s. 13 para 9).

24. Protective clothing that will not be reused decontaminated and disposed of as asbestos waste (s. 13 para 10).

25. Non-powered reusable or replaceable air purifying dust respirators suitable for asbestos provided by employer (s. 13 para 8).

26. Respirators cleaned, disinfected and inspected after use on each shift (clause 10(1)(e)).

27. Respirators in good state of repair (clause 10(1)(f)).

28. Respirators fitted with an effective seal, where applicable (clause 10(1)(a)).

29. Written procedures for respirator use, care and selection (subsection 10(2)).

Type 2 Operations (cont'd)

30. Instruction provided on the use and care of respirators (subsection 13(3)).

31. Clean, convenient and sanitary location for respirator storage (clause 10(1)(g)).

Other Measures

32. Washing facilities for hands and face provided (s. 11 para 8).

33. Washing facilities used by workers (s. 11 para 8).

34. Instruction and training provided (s. 15).

35. Asbestos work records (s. 16).

Type 3 Operations

A. Type 3 Operation Mentioned in Subclause 9(1)(c)(v) of Regulation (Work with a power tool not equipped with a dust collection device and HEPA filter)

1. Construction Health and Safety Branch notified (s. 8).

Preparation of the Work Area

2. Work area separated from rest of workplace by walls, barricades, fencing or other suitable means (s. 14 para 2).

3. Work area identified by signs warning of asbestos dust hazard (s. 14 para 1).

4. Warning signs state that access is restricted to persons wearing protective clothing and equipment (s. 14 para 3).

5. Spread of asbestos dust from work area controlled by walls or an enclosure of polyethylene or other suitable material (s. 14 subpara 4 i).

6. Entrances to and exits from work area fitted with curtains of polyethylene sheeting or other suitable material (s. 14 subpara 4 i).

Protective Clothing and Equipment

7. All workers in work area wear protective clothing and equipment (s. 12 para 7).

8. Powered air purifying positive pressure dust respirator suitable for protection against asbestos provided by employer (s. 14 subpara 4 iv).

9. Respirators cleaned, disinfected and inspected after use on each shift (clause 10(1)(e)).

10. Respirators in good state of repair (clause 10(1)(f)).

11. Written procedures for respirator use, care and selection (subsection 10(2)).

12. Clean, convenient and sanitary location for respirator storage (clause 10(1)(g)).

13. Instruction provided on the use and care of respirators (subsection 13(3)).

14. Protective clothing provided by employer (s. 12 para 5).

Type 3 Operations - A. (cont'd)

15. Protective clothing made of material that does not readily retain or permit penetration of asbestos fibres (s. 12 para 5).

16. Footwear and head covering included as protective clothing (s. 12 para 5).

17. Protective clothing repaired or replaced if torn (s. 12 para 5).

18. Protective clothing decontaminated by damp wiping or with vacuum equipped with a HEPA filter before leaving work area (s. 14 subpara 4 v).

19. Protective clothing that will not be reused to be decontaminated and disposed of as asbestos waste (s. 14 subpara 4 vi).

Work Practices

20. Eating, drinking, chewing or smoking prohibited in work area (s. 12 para 2).

21. Wetting agent added to water used to control spread of dust (s. 12 para 1).

22. Compressed air not used to clean up and remove dust from any surface (s. 12 para 6).

23. Dust and waste containing asbestos cleaned up and removed frequently and at regular intervals during the doing of the work and immediately on completion of the work (s. 14 subpara 4 ii).

24. Asbestos waste placed in dust-tight containers that are impervious to asbestos and identified as containing asbestos waste (s. 14 subpara 4 ii).

25. Polyethylene sheeting or other material used for barriers and enclosures not reused (s. 14 subpara 4 iii).

26. Drop sheets and barriers wetted and disposed of as asbestos waste (s. 14 subpara 4 iii).

Other Measures

27. Washing facilities for hands and face provided (s. 11 para 8).

28. Washing facilities used by workers (s. 11 para 8).

29. Instruction and training provided (s. 15).

30. Asbestos work records (s. 16).

Type 3 Operations (cont'd)

B. Outdoor Asbestos Removal

1. Construction Health and Safety Branch notified (s. 8).

Preparation of the Work Area

2. Work area separated from rest of workplace by walls, barricades, fencing or other suitable means (s. 14 para 2).

3. Work area identified by signs warning of asbestos dust hazard (s. 14 para 1).

4. Warning signs state that access is restricted to persons wearing protective clothing and equipment (s. 14 para 3).

5. Temporary electrical systems for wet removal operations equipped with ground fault circuit interrupters (s. 14 subpara 5 v).

6. Three-room decontamination facility located as close as practicable to the work area (s. 14 subpara 5 v).

Work Practices

7. Eating, drinking, chewing or smoking prohibited in work area (s. 12 para 2).

8. Wetting agent added to water to control the spread of asbestos dust (s. 12 para 1).

9. Friable material that may be disturbed, wetted, unless wetting would create a hazard or cause damage (s. 14 subpara 5 i).*

10. Dust and waste containing asbestos not permitted to fall freely from one work level to another (s. 14 subpara 5 ii).

11. Compressed air not used to clean up and remove dust from any surface (s. 12 para 6).

12. Asbestos dust and waste cleaned up at regular intervals (s. 14 subpara 5 iii).

13. Waste in dust-tight containers (s. 14 subpara 5 iii).

14. Waste containers identified as containing asbestos (s. 12 para 3).

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* Where practicable.

Type 3 Operations - B. (cont'd)

Protective Clothing and Equipment

15. All persons in work area wear protective clothing and equipment (s. 12 para 7).

16. Appropriate respirator provided by employer (s. 14 sub-para 5 viii).

• work with wet friable material that contains only chrysotile asbestos	non-powered reusable or replaceable air purifying dust respirator suitable for asbestos
• work with wet friable material that contains asbestos of a type other than chrysotile	powered air purifying positive pressure dust respirator suitable for asbestos
• work with friable material that cannot be wetted	supplied air, positive pressure full facepiece respirator

17. Respirators cleaned, disinfected and inspected after use on each shift (clause 10(1)(e)).

18. Respirators in good state of repair (clause 10(1)(f)).

19. Respirators fitted with an effective seal, where applicable (clause 10 (1)(a)).

20. Written procedures for respirator use, care and selection (subsection 10(2)).

21. Instruction provided in the use and care of respirators (subsection 15(3)).

22. Clean, convenient and sanitary location for respirator storage (clause 10(1)(g)).

23. Protective clothing provided by employer (s. 12 para 5).

24. Protective clothing made of material that does not readily retain or permit penetration of asbestos fibres (s. 12 para 5).

25. Footwear and head covering included as protective clothing (s. 12 para 5).

26. Protective clothing repaired if torn (s. 12 para 5).

Type 3 Operations - B. (cont'd)

27. Protective clothing removed in decontamination facility (s. 14 subpara 5 vii).

28. Protective clothing that will be reused decontaminated by damp wiping or with vacuum equipped with a HEPA filter (s. 14 subpara 5 vii).

29. Protective clothing that will not be reused decontaminated and disposed of as asbestos waste (s. 14 subpara 5 vii).

Washing Facilities

30. Shower room provided in decontamination facility (s. 14 subpara 5 vii).

31. Shower provided with hot and cold water or water at a temperature between 40°C and 50°C (s. 14 subpara 6 iv).

32. Controls available to regulate water flow and temperature (where applicable) of shower (s. 14 subpara 6 iv).

33. Hot water supply adequate to maintain minimum temperature of 40°C (s. 14 subpara 6 iv).

34. Shower room provided with towels (s. 14 subpara 6 iv).

35. Shower used by every worker when leaving the work area (s. 14 subpara 5 vii).

Other Measures

36. Work area washed down with water after completion of the clean-up and removal, where practicable (s. 14 subpara 5 iv).

37. Instruction and training provided (s. 15).

38. Asbestos work records (s. 16).

C. Type 3 Operations other than Outdoor Asbestos Removal and Work with Power Tools not Equipped with Dust Collection Device and HEPA Filter.

1. Construction Health and Safety Branch notified (s. 8).

Preparation of the Work Area

2. Work area separated from rest of workplace by walls, barricades, fencing or other suitable means (s. 14 para 2).

Type 3 Operations - C. (cont'd)

3. Work area identified by signs warning of asbestos dust hazard (s. 14 para 1).

4. Warning signs state that access is restricted to persons wearing protective clothing and equipment (s. 14 para 3).

5. Asbestos-containing dust removed from work area by damp wiping or vacuuming with a HEPA filter-equipped vacuum (s. 14 subpara 6 i).

6. Articles in work area removed or covered with polyethylene or other suitable material (s. 14 subpara 6 i).

7. Non-watertight electrical system locked out for wet removal, where practicable (s. 14 subpara 6 vi).

8. Temporary electrical systems for wet removal operations equipped with ground fault circuit interrupters (s. 14 subpara 6 vii).

9. Mechanical ventilation system serving the work area disabled (s. 14 subpara 6 iii).

10. Ventilation ducts and other openings to and from the work area sealed (s. 14 subpara 6 iii).

11. Spread of asbestos dust controlled by an enclosure of polyethylene or other suitable material (s. 14 subpara 6 ii).

12. Entrances to and exits from work area fitted with curtains of polyethylene sheeting or other suitable material (s. 14 subpara 6 ii).

13. Three-room decontamination facility incorporated into enclosure (s. 14 subpara 6 ii).

Work Practices

14. Work area inspected at least daily for defects in enclosure, barriers or decontamination facility (s. 14 subpara 6 x).

15. Work discontinued until all defects repaired (s. 14 subpara 6 xi).

16. Eating, drinking, chewing or smoking prohibited in work area (s. 12 para 2).

17. Wetting agent added to water to control the spread of asbestos dust (s. 12 para 1).

Other Type 3 Operations - C. (cont'd)

18. Friable material that may be disturbed, wetted, unless wetting would create a hazard or cause damage (s. 14 subpara 6 viii).

19. Dust and waste containing asbestos kept wet, where practicable (s. 14 subpara 6 xii).

20. Compressed air not used to clean up and remove dust from any surface (s. 12 para 6).

21. Dust and waste containing asbestos cleaned up and removed frequently and at regular intervals (s. 14 subpara 6 xiii).

22. Asbestos waste placed in dust-tight containers that are impervious to asbestos and identified as containing asbestos waste (s. 14 subpara 6 xiii).

23. All persons in work area wear protective clothing and equipment (s. 12 para 7).

Protective Clothing and Equipment

24. Appropriate respirator provided by employer (s. 14 subpara 6 ix).

• work with wet friable material that contains only chrysotile asbestos	non-powered reusable or replaceable air purifying dust respirator suitable for asbestos
• work with wet friable material that contains asbestos of a type other than chrysotile	powered air purifying positive pressure dust respirator suitable for asbestos
• work with friable material that cannot be wetted	supplied air, positive pressure full facepiece respirator

25. Respirators cleaned, disinfected and inspected after use on each shift (clause 10(1)(e)).

26. Respirators in good state of repair (clause 10(1)(f)).

27. Respirators fitted with an effective seal, where applicable (clause 10(1)(a)).

28. Written procedures for respirator use, care and selection (subsection 10(2)).

Other Type 3 Operations - C. (cont'd)

29. Instruction provided in the use and care of respirators (subsection 15(3)).

30. Clean, convenient and sanitary location for respirator storage (clause 10(1)(g)).

31. Protective clothing provided by employer (s. 12 para 5).

32. Protective clothing made of material that does not readily retain or permit penetration of asbestos fibres (s. 12 para 5).

33. Footwear and head covering included as protective clothing (s. 12 para 5).

34. Protective clothing repaired or replaced if torn (s. 12 para 5).

35. Protective clothing removed in decontamination facility (s. 14 subpara 6 v).

36. Protective clothing that will be reused decontaminated by damp wiping or with vacuum equipped with a HEPA filter (s. 14 subpara 6 v).

37. Protective clothing that will not be reused decontaminated and disposed of as asbestos waste (s. 14 subpara 6 v).

Clean-up Procedures

38. Dust and waste cleaned up and removed immediately on completion of the work (s. 14 subpara 6 xiii).

39. Work area cleaned by thorough washing and vacuuming with HEPA filter-equipped vacuum before dismantling enclosure (s. 14 subpara 6 xiv).

40. Equipment and tools cleaned by damp wiping and vacuuming with HEPA filter-equipped vacuum or disposed of as asbestos waste (s. 14 subpara 6 xiv).

Washing Facilities

41. Shower room provided in decontamination facility (s. 14 subpara 6 ii).

42. Shower provided with hot and cold water or water at a temperature between 40°C and 50°C (s. 14 subpara 6 iv).

43. Controls available to regulate water flow and temperature (where applicable) of shower (s. 14 subpara 6 iv).

Other Type 3 Operations - C. (cont'd)

44. Hot water supply adequate to maintain minimum temperature of 40°C (s. 14 subpara 6 iv).

45. Shower room provided with towels (s. 14 subpara 6 iv).

46. Shower used by every worker when leaving the work area (s. 14 subpara 6 v).

Other Measures

47. Instruction and training provided (s. 15).

48. Asbestos work records (s. 16).

APPENDIX 4 - Respirator Inspection Checklist

All respirators must be suitable for protection against asbestos. Check for NIOSH certification or other appropriate approval.

A. Disposable Air Purifying Respirators (Dust Masks)

Examine:

- filters for holes or tears;
- straps for elasticity and deterioration;
- metal nose clip for deterioration.

Obtain new respirator, as necessary.

B. Other Air Purifying Respirators

1. Examine the facepiece for:

   - excessive dirt;
   - cracks, tears or holes (obtain new facepiece);
   - distortion and inflexibility (stretch and knead to restore shape and flexibility or obtain new facepiece);
   - cracked, scratched or loose fitting lenses (replace lens or obtain new facepiece);
   - crack or breaks in filter holders, worn threads and missing gaskets.

2. Examine the head straps for:

   - breaks or tears;
   - loss of elasticity;
   - broken or malfunctioning buckles and attachments;
   - excessively worn serrations on head harness, which might permit slippage (full facepieces only).

3. Examine valves for:

- detergent residue, dust or other material on valves or valve seats;
- cracks, tears or distortion in the valve material;
- missing or defective valve covers.

4. Examine the air purifying element for:

- proper filter for protection against asbestos;
- incorrect installation, loose connections, missing or worn gaskets or cross threading;
- cracks or dents in filter housing.

C. Supplied Air Respirators

1. Check facepiece, headstraps and valves as for air purifying respirators.

2. If the device is a hood, helmet, blouse or full suit, do the following:

- check for rips and torn seams;
- check headgear suspension;
- examine face shield for cracks, breaks or defects that would impair vision.

3. Examine air supply system for:

- breathing air quality; must meet the requirements of CSA Standard Z180.1-M1978;
- integrity and good condition of air supply lines and hoses, including attachments and end fittings;
- tightness of connections;
- proper setting of regulators and valves.

APPENDIX 5 - Procedure for Cleaning and Disinfecting Respirators

1. Remove filters and disassemble facepieces. Discard or repair any defective parts.

2. Wash components in warm water (50°C - 60°C) with a mild detergent,* using a brush.

3. Thoroughly rinse components in clean, warm water.

4. Where disinfection is required, the respirator components should be immersed for two minutes in one of the following solutions:*

   A. Hypochlorite solution (50 ppm of chlorine), made by adding approximately two millilitre (mL) of laundry bleach to one litre of water (or two teaspoons of bleach per gallon of water).

   B. Iodine solution (50 ppm of iodine) made by adding 0.8 mL of tincture of iodine to one litre of water (or one teaspoon of iodine per gallon of water).

5. Rinse in clean, warm water to remove all residual disinfectant.

6. Air dry or hand dry components with a clean, lint-free cloth.

7. Reassemble respirator and test to ensure that all components are working properly (see Appendix 4).

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* Respirator suppliers can provide ready-made cleaning and disinfectant solutions and instructions for their proper use.

APPENDIX 6 - Bulk Sampling Procedure

To determine if a friable material contains asbestos, it is necessary to obtain one or more samples for laboratory analysis. This is a potentially hazardous operation because if the material does contain asbestos, taking a sample can cause a significant release of fibres. The following procedure employs core sampling, which allows collection of a multi-layered sample with a minimum disruption of the material.

Core Sampler

A core sampler can be made from available office or laboratory equipment. Any cylindrical device that is thin walled, has a sharpened edge, or an edge that can be sharpened, and a diameter of about a quarter of an inch can be used. It is best if the sampler ends can be sealed and the sampler used as a container as this will eliminate the transfer and cleaning steps of the sampling procedure. A reusable sampler will require a plunger to eject the sample from the sampling tube.

Sampling Procedure

1. Wear an air purifying dust respirator suitable for protection against asbestos.

2. Wet the surface of the material to be sampled. Use a spray bottle to apply the water. Laundry or dishwashing detergent can be added to the water for better wetting.

3. If the material cannot be wetted, a plastic bag or other containment device should be placed around the sampler.

4. Obtain a sample by slowly pushing the sampler into the material with a twisting motion, until the entire thickness is penetrated, and then extract the sampler.

5. If the sampler is to be reused, eject the sample into a sealable plastic bag or other container and wet wipe the tube and plunger of the sampler.

6. With a single-use sampler, wet wipe the exterior of the tube and cap it.

7. Label the container.

8. Clean up any debris with wet paper towels and discard in a plastic bag.

9. Repair sampler damage with latex paint or tape.

APPENDIX 7 - Procedure for Work with Asbestos-containing Friction Material

Chrysotile asbestos is widely used as a major component of friction materials. These materials are most commonly found in the automotive industry as brake linings, disc brake pads and clutch facings. Their asbestos content can vary from 10 to 70 per cent. Because the fibres are locked-in or bound by a resin binder, the potential for asbestos exposure is low during normal handling. Potentially hazardous airborne concentrations can be created, however, by improper cleaning and handling of worn brake and clutch assemblies, uncontrolled machining operations and poor housekeeping.

In most cases the installation and removal of asbestos-containing friction materials would be classified under the regulation as a Type 1 operation. If machining is required and the work is done with a power tool that is not equipped with a dust collection device and HEPA filter, it would be a Type 3 operation. The following procedure meets the requirements for a Type 1 operation. However, if a worker requests a respirator, it must be provided, and additional provisions dealing with respirators would be required.

1. Use a drop sheet of polyethylene or other suitable material to control the spread of dust from the work area.

2. Where possible, use pre-machined materials that are ready for installation.

3. Where machining is necessary, equipment must have local exhaust with a suitable dust collection device and HEPA filter.

4. When removing worn friction materials, clean the accumulated dust in the assemblies either by vacuuming with a HEPA filter-equipped vacuum or by wiping with a damp cloth.

5. Remove dust from new materials by damp wiping or vacuuming with a HEPA filter-equipped vacuum.

6. Compressed air must not be used to remove dust from any surface in the work area.

7. There must be no eating, drinking, chewing or smoking in the work area.

8. Dust must not be allowed to accumulate in the work area.

9. Dust and other waste containing asbestos must be cleaned up either by vacuuming with a HEPA filter-equipped vacuum or by damp wiping, and placed for disposal in a dust-tight container labelled as containing asbestos.

10. Drop sheets must be either cleaned for reuse by damp wiping or vacuuming with a HEPA filter-equipped vacuum, or wetted and disposed of as asbestos waste.

11. Washing facilities must be used by each worker when leaving the work area.

APPENDIX 8 - Glove Bag Procedure

Glove bags (also known as containment bags) may be used for the removal of asbestos-containing pipe insulation. Under section 9 of the regulation, such work would be classified as either a Type 2 or Type 3 operation, depending on how extensive it is. However, no mention of glove bags is made in the procedures for carrying out a Type 2 or Type 3 operation. **Therefore, an employer wishing to use a glove bag procedure must apply to the director of the Construction Health and Safety Branch for a variance under section 18 of the regulation.** To facilitate this process, the following procedure is provided. The removal of asbestos-containing pipe insulation in accordance with this procedure will be accepted as equivalent to the measures and procedures specified in sections 12, 13 and 14 of the regulation.

1. The procedures specified by the glove bag supplier/manufacturer shall be followed and the employer shall ensure that a worker is trained in the use of the glove bag prior to the doing of the work.

2. Glove bags shall not be used where the pipe temperature exceeds 65°C.

3. Glove bags shall not be used to remove pipe insulation that has a jacketing made of aluminum of thickness exceeding 0.51mm (24 gauge) or a jacketing made of steel.

4. Glove bags may be used to remove pipe insulation that has a jacketing made of aluminum of thickness less than 0.51 mm (24 gauge) so long as the following conditions are satisfied:

    (i) the length of each section of the jacketing shall not exceed the length of the glove bag;

(ii) the jacketing shall be removed only after the glove bag has been attached to the pipe and sealed; and

(iii) any jagged or sharp edges that have been produced during the removal of the jacketing shall be handled in such a way so as to minimize the possibility of ripping or puncturing the glove bag.

5. A wetting agent shall be added to water that is to be used to control the spread of asbestos dust.

6. Compressed air shall not be used to clean up and remove dust from any surface.

7. Eating, drinking, chewing or smoking shall not be permitted in the work area.

8. The work area shall be identified by clearly visible signs warning of the asbestos dust hazard.

9. If the work is being carried on indoors, the work area shall be separated from the rest of the workplace by walls or by the placing of barricades or fencing or by some other suitable means.

10. The employer shall provide every worker who will enter the work area with respiratory protective equipment, and the worker shall wear and use the equipment. The respirator shall be a non-powered reusable or replaceable air purifying dust respirator suitable for protection against asbestos.

Note: Respirators certified by the U.S. National Institute for Occupational Safety and Health (NIOSH) or the British Standards Institution meet this requirement.

11. Dust that has fallen from the pipe insulation material shall be cleaned up and removed prior to the attaching of the glove bag by using a vacuum equipped with a HEPA filter or by damp wiping.

12. Friable material containing asbestos that will be disturbed or removed during the work shall be thoroughly wetted before the glove bag is attached and frequently and at regular intervals during the doing of the work.

13. The glove bag shall be inspected for defects before commencing the work. A defective glove bag shall not be used.

14. Tools used inside a glove bag shall be so designed that the likelihood of puncturing or cutting the glove bag is minimized; a knife used inside a glove bag shall have a retractable blade; a saw used inside a glove bag shall be the flexible wire type; a brush used inside a glove bag shall not have metal bristles.

15. If the glove bag is ripped, cut or opened in any way, work that may disturb the friable material shall cease immediately. If the rip, cut or opening is small and easy to repair, then the glove bag shall be repaired forthwith with tape. Work may continue once the repairs are complete. If the rip, cut or opening is not small and, not easy to repair, then every worker in the work area shall immediately don protective clothing, and the protective clothing,

    (i) shall be made of a material that does not readily retain or permit penetration of asbestos fibres,
    (ii) shall consist of full body covering, including head covering with snug fitting cuffs at the wrists, ankles and neck,
    (iii) shall include suitable footwear, and
    (iv) shall be repaired or replaced if torn.

The glove bag shall be disposed of forthwith in accordance with the requirements of paragraph 20 below. Any asbestos-containing material released shall be cleaned up and removed by using a vacuum equipped with a HEPA filter or by damp wiping.

16. Before leaving the work area, a worker wearing protective clothing shall decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter or by damp wiping.

17. If protective clothing will not be reused, the worker, after decontaminating his or her protective clothing, shall dispose of it in a container that meets the requirements of paragraph 20 below.

18. Facilities for washing the hands and arms shall be made available to the worker and shall be used by every worker when leaving the work area.

19. Frequently, and at regular intervals during the doing of the work and immediately upon completion of the work, glove bags containing asbestos-contaminated dust and waste shall be placed in a container conforming with paragraph 20 below and shall be removed from the workplace.

20. Containers for dust and waste containing asbestos shall be,

    (i) dust-tight,
    (ii) suitable for the type of waste,
    (iii) impervious to asbestos,
    (iv) identified as containing asbestos waste,
    (v) cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before being removed from the work area, and
    (vi) removed from the workplace frequently and at regular intervals.

APPENDIX 9 - Ministry of Labour District Offices

Barrie
Industrial Health and Safety
114 Worsley Street
L4M 1M1
(705) 722-6642
1-800-461-4383*

Elliot Lake
Mining Health and Safety
Algo Centre
151 Ontario Avenue
P5A 2T2
(705) 848-2885

Hamilton
119 King Street West
L8N 3Z9
Construction Health and Safety
Industrial Health and Safety
(416) 521-7736
1-800-263-6906(8)*

Kingston
1055 Princess Street, Suite 105
K7L 1H3
Construction Health and Safety
Industrial Health and Safety
(613) 545-4340
1-800-267-0915*
Mining Health and Safety
(Suite 301)
(613) 545-4335
1-800-267-0915*

Kirkland Lake
Mining Health and Safety
38 Second Street
P2N 1A2
(705) 567-5241

Kitchener
824 King Street West
N2G 1G1
Construction Health and Safety
Industrial Health and Safety
(519) 744-8101
1-800-265-2373*

London
205 Oxford Street East
N6A 5G6
Construction Health and Safety
Industrial Health and Safety
Mining Health and Safety
(519) 439-3231
1-800-265-4707*

North Bay
Industrial Health and Safety
1500 Fisher Street
Northgate Square
P1B 2H3
(705) 476-2711
1-800-461-1654*

Ottawa
2197 Riverside Drive
K1H 7X3
Construction Health and Safety
Industrial Health and Safety
(613) 523-7530
1-800-267-1916*

Peterborough
139 George Street North
K9J 3G6
Construction Health and Safety
(705) 742-3436
1-800-461-1425*
Industrial Health and Safety
(705) 876-1800
1-800-461-1425*

Richmond Hill
Mining Health and Safety
10720 Yonge Street
L4C 3C9
(416) 884-6551
1-800-268-3829*

St. Catharines
205 King Street
L2R 3J5
Construction Health and Safety
Industrial Health and Safety
(416) 682-7261
1-800-263-7260*

Sarnia
Industrial Health and Safety
700 Christina Street North
N7V 3C2
(519) 336-1200
1-800-265-1416*

Sault Ste. Marie
390 Bay Street
P6A 1X2
Construction Health and Safety
Industrial Health and Safety
(705) 949-3331
1-800-461-7268*

Sudbury
199 Larch Street
P3E 5P9
Construction Health and Safety
Industrial Health and Safety
(705) 675-4455
1-800-461-4000*
Mining Health and Safety
(705) 675-4464
1-800-461-4000*

Sudbury
260 Cedar Street
P3B 3X2
Mining Health and Safety
(Chief Engineers)
(705) 675-4468
1-800-461-4000*

Thunder Bay
435 James Street South
P7E 6E3
Construction Health and Safety
Industrial Health and Safety
(807) 475-1691
1-800-465-5016(7)*
Mining Health and Safety
(807) 475-1675
1-800-465-5016(7)*

Timmins
273 Third Avenue
P4N 1E2
Construction Health and Safety
Industrial Health and Safety
Mining Health and Safety
(705) 267-6231
Zenith 57740* (Mining)

Toronto East
2500 Lawrence Avenue East
Scarborough
M1P 2R7
Construction Health and Safety
Industrial Health and Safety
(416) 750-3557
1-800-268-6541*

Toronto West
2 Robert Speck Parkway
Mississauga
L4Z 1H8
Construction Health and Safety
Industrial Health and Safety
(416) 273-7800
1-800-268-2966(7)*

Windsor
500 Ouellette Avenue, Suite 305
N9A 1B3
Construction Health and Safety
Industrial Health and Safety
(519) 256-8278
1-800-265-5140(4)*

Occupational Health Branch Laboratory
101 Resources Road
Weston, Ontario
M9P 3T1
(416) 248-7261

Head Office
400 University Avenue
Toronto, Ontario
M7A 1T7

Construction Health and Safety
(416) 965-7161
1-800-268-8013*
Industrial Health and Safety
(416) 965-4125
1-800-268-8013*
Mining Health and Safety
(416) 965-1328
1-800-268-8013*
Occupational Health
(416) 965-3211
1-800-268-8013*
Special Studies and Services
(416) 965-2493
1-800-268-8013*
Standards and Programs
(416) 965-8710
1-800-268-8013*

* Toll free line. For callers located within the area code but outside the local calling area of this city. Consult the blue pages in your local telephone directory for additional information. The ministry may also be reached 24 hours a day through the emergency telephone number in Toronto: (416) 965-1211.

APPENDIX 10 - Supplementary Reading Materials

Report of the Royal Commission on Matters of Health and Safety Arising From the Use of Asbestos in Ontario, published by the Ontario Ministry of the Attorney General (available from the Ontario Government Bookstore, 880 Bay Street, Toronto M7A 1N8; Tel. (416) 965-6015).

U.S. Environmental Protection Agency (EPA), Guidance for Controlling Asbestos-Containing Materials in Buildings, Office of Toxic Substances, Washington D.C. 20460.

Asbestos in Construction, Alteration, Repair and Demolition, Construction Safety Association of Ontario, 74 Victoria Street, Toronto, Ontario, M5C 2A5.

Asbestos in the Workplace - a series of practical guidebooks, Council of Safety Associations, 2 Bloor Street East, Toronto, Ontario M4W 3C3.

Pinchin, D.J., Asbestos in Buildings, Study No. 8 in Series Prepared for the Royal Commission on Asbestos (available from Ontario Government Bookstore, 880 Bay Street, Toronto M7A 1N8; Tel. (416) 965-6015).